MAGNI

MM-410 Waveform/Vector Rasterizing Monitor

AVM-510A Series Automated Video Monitors

Operator's Manual

946-5500-00 November 2001

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1. About This Manual

Introduction

This manual describes how to install, configure, and operate the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A). The information presented will help to familiarize you with all aspects of the MM-410/AVM-510A and provide a reference tool for questions you might have in the future.

Audience

This guide is written specifically for anyone responsible for installing, configuring, and operating the MM-410/AVM-510A.

Organization

This manual contains the following:

- Chapter 1: *About This Manual*— Describes the organization of this manual. Conventions, special notices, and safety precautions used throughout the manual are also included.
- Chapter 2: *Product Overview (MM-410)*— Describes the features and capabilities of the MM-410.
- Chapter 3: *Product Overview (AVM-510A)*— Describes the features and capabilities of the AVM-510A.
- Chapter 4: *Installation*— Describes how to connect and configure the MM-410/AVM-510A.
- Chapter 5: *Front Panel Operation*— Explains how to use the MM-410/AVM-510A front panel menu buttons.
- Chapter 6: *Operating the MM-410/AVM-510A* — Explains how to operate the AVM-510A/ MM-410 using the menu options that are accessible from the front panel.
- Chapter 7: *Viewing Waveforms, Vectors, and Pictures* — Explains how to view waveforms, vectors, and pictures using the MM-410/AVM-510A.
- Chapter 8: *Audio (AVM-510A)*— Explains how to add audio measurement to an AVM-510A display.
- Chapter 9: *Automatic Measurement (AVM-510A)*— Explains how to take specific kinds of measurements on the most common types of test signals for the AVM-510A.
- Chapter 10: *Measurement Screens (Parameters and Limits) (AVM-510A)*— Lists details about the AVM-510A automeasurement screens.

- Chapter 11: *AVM-510A Option T (For Transmission Monitoring)*— Describes the functions added to the AVM-510A using the option T.
- Chapter 12: *AVM-510A-C (For Component Measurements)*— Describes the component measurement set and the digital measurement set when an SDM-550 is interconnected.
- Appendix A: *Specifications*— Lists the MM-410/AVM-510A electrical and mechanical specifications.
- Appendix B: *Connector Pinouts*— Identifies and describes the pinouts of each connector on the MM-410/AVM-510A.
- Appendix C: *Memory Locations* — Lists the recommended memory locations for the MM-410/AVM-510A.
- Appendix D: *Calibration*— Explains how to access the *Calibration* menu options for the MM-410/AVM-510A.
- Appendix E: *Command Codes (AVM-510A)*— Describes the RS-232 protocol between the MM-410/AVM-510A and a PC.
- Appendix F: *Glossary of Terms*— Lists commonly used video and graphics terminology.

Conventions

Convention Example	Description
Refer to	Italics are typically used for titles, menus, and references to other sections of this manual or other manuals.
`A:\setup`	Monospaced text indicates a command that you need to enter to run an application or utility.
Enter	Bold faced text indicates a key that must be pressed on a PC keyboard to complete an action.
INPUT	Upper case text indicates an option from the *Config* or *Msmt* menu that has sub-menu options under it when selected.

Special Notices

Two kinds of special notices are used in this Operator's manual to emphasize specific information.

WARNING: indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

CAUTION: indicates the presence of a hazard that might cause damage to hardware or that might corrupt software.

Safety Precautions

Adhere to the following safety precautions to ensure proper use of the MM-410/AVM-510A.

WARNING: FOR PLUGGABLE EQUIPMENT, THE SOCKET OUTLET SHALL BE INSTALLED NEAR THE EQUIPMENT AND SHALL BE EASILY ACCESSIBLE.

CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

Notes

2. Product Overview (MM-410)

MM-410 Waveform/Vector Rasterizing Monitor

The MM-410 Series monitors are dual standard (NTSC and PAL) and multi-format (Beta, MII, S-Video, EBU, GBR). Separate A and B input selections provide for easy transitions between composite and component monitoring. The MM-410 loop through inputs can be configured for:

- Two composite or one composite and one S-video
- One composite and one 3-wire component

Simultaneous display of both A and B channels provides for easy camera timing and color matching required when:

- Setting and balancing camera levels
- Checking time base correctors
- Assuring color fidelity and timing for editing

Magni's patented raster technology with 10-bit signal processing provides accurate waveform and vector displays on a standard color picture monitor. It allows viewing waveforms, with superior display accuracy as the raster-based display is not subject to CRT errors.

Features include a unique split screen mode, providing picture, waveform, and vector on a single display. You will appreciate the unique peak video over limit region identified in red. Other features, like on-screen readouts of SC/H, phase, color frame indicator, and blanking graticule, make advanced equipment setup easy for the experienced engineer. User friendly front panel control and 10 memory pre-sets provide instant set-up recall such as composite parade of filters or component waveform parade. Magnification and line select modes, enable viewing of VITS and a vertical blanking interval.

The MM-410 is a compact low-power design (1 RU) that fits the smallest editing suites or ENG vans.

MM-410 Features

- Works in all standard 525 and 625 analog formats: NTSC, PAL, SMPTE, EBU, Beta, MII, S-video, GBR (RGB)
- Waveform and vectors can be colored separately
- No distortion of display due to cathode ray tube aging
- Waveform and vector images can be captured and stored
- Captures transient events with its infinite persistence feature
- Display picture, waveform and vector together
- Output display can be looped to several monitors
- Maximum sweep rate of 0.1 µs/division
- Displays SC/H Phase continuously
- Overlay two signals for comparison
- PAL graticule can be in volts or percent
- Custom names for inputs, identifying the signal source
- Videotape waveforms and vectors
- Horizontal position “scrolls” waveform in magnified sweeps
- Automatically switches between 525 and 625
- Displays waveform and vector together in different colors
- No burn in from steady, bright displays
- Variable persistence as well as intensity
- 10 memories to store front panel and other settings
- Input labels show selected format
- View the picture while monitoring signal measurements with Picture Guard
- Displays VITC (Vertical Interval Time Code) continuously
- Parade display of component signal parts or composite filters
- Adjust two signals to match using a picture display
- Vector rotation “scrolls”
- Waveform turns red where amplitude exceeds adjustable limits
- Display captured waveforms and compare with current waveform on one screen

MM-410 Front View

The following LEDs, indicators, buttons, switches (knobs) can be viewed from the front of the MM-410 (see Figure 2-1).

NOTE: Some buttons on the front panel have two functions when used in conjunction with the **Blue** (2nd) button.

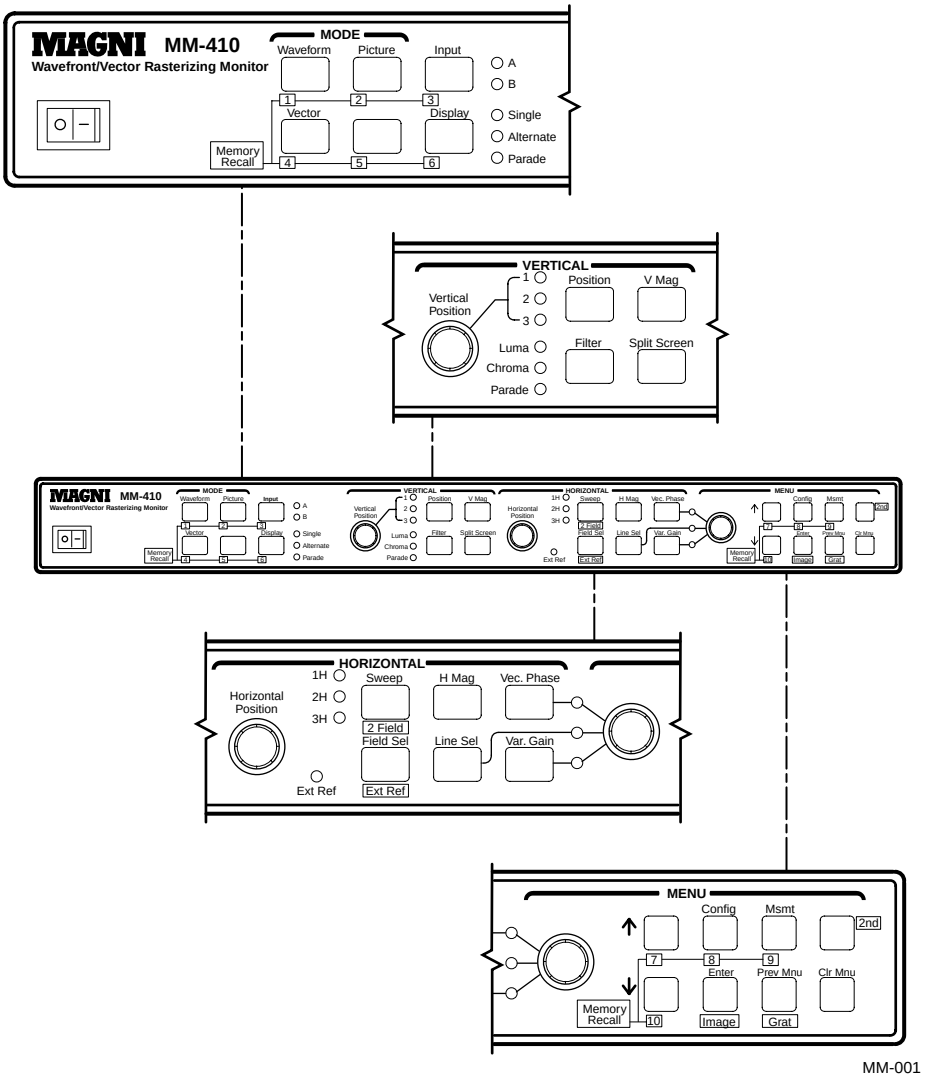


Figure 2-1. MM-410 Front View

Power Switch

Powers the MM-410 on and off.

Mode Buttons

The **Mode** buttons and the **Blue** button determine what the monitor displays: Waveform, Vector, Picture, or Memory Recall.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Input Button

This button lets you choose three signal inputs (Input A: only, Input B: only, or both Input A: and Input B).

Input Signal LEDs

Two Input Signal LEDs (Input A: only, Input B: only, or both Input A: and Input B:) light in conjunction with the three **Input** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Display Button

This button lets you choose between a Single, Alternate, or Parade view of component signals.

Display Button LEDs

Three Display LEDs (Single, Alternate, and Parade) light in conjunction with the three **Display** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Vertical Position Knob and Buttons

The vertical section of the front panel includes four buttons and one knob: Position (**Position**), Vertical Magnification (**V Mag**), Filter (**Filter**), and Split Screen (**Split Screen**), and a vertical positioning knob for vertical control options.

Position LEDs

Three Position LEDs (1, 2, and 3) light in conjunction with the three **Position** buttons selections.

Filter LEDs

Three Filter LEDs (Luma, Chroma, and Parade) light in conjunction with the three **Filter** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Horizontal Position Knob, LEDs, and Buttons

The horizontal section of the front panel includes six buttons and one knob: Line Select (**Line Sel**) and Field Select (**Field Sel**), Sweep (**Sweep**) and Horizontal Magnification (**H Mag**), Vector Phase (**Vec. Phase**), and Variable Gain (**Var. Gain**), and a horizontal positioning knob for horizontal control options.

Sweep LEDs

Three Sweep LEDs (1H, 2H, and 2F) light in conjunction with the three **Sweep** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Rotary Switch (Knob)

The right knob is used to adjust the Vector Phase, Line Select, and Variable Gain functions of the MM-410. It can also be used to select and adjust items in the menu options.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Menu Buttons

These buttons let you configure the MM-410 to fit your specific needs.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410 using the front panel buttons.

Blue Button Functions

Press the **Blue** button and then the button with the function outlined in a blue box. For example, memories are recalled by pressing the **Blue** button and then the button with the number of the memory outlined in blue.

MM-410 Rear View

The following cable connectors can be viewed from the rear of the MM-410 (see Figure 2-2).

Legend	Connector	Function
❶	RS-232	Lets you connect to a PC for system updates.
❷	Picture monitor outputs	These outputs (S-video and composite) are available for a picture monitor display of a picture, waveforms, or signal status.
❸	Composite (A)	One switchable loop-through composite input.
❹	Composite (B), CPST or G/Y	One switchable loop-through composite, CPST, or G/Y component input.
❺	CNPT (B)	One switchable loop-through B/B-Y component input.
❻	CNPT (B)	One switchable loop-through R/R-Y component input.
❼	Power	Line voltage power connector (ac input).
❽	DC control	Lets you select any of the first four memories by grounding (earthing) pins 1 through 4. *Refer to Chapter 4, "Installation," for additional information on this connector.*
❾	External reference	A composite analog external reference signal representing studio reference timing.
❿	S-video (A or B)	One switchable loop-through S-video input. Can only be selected using the *Input* menu options.

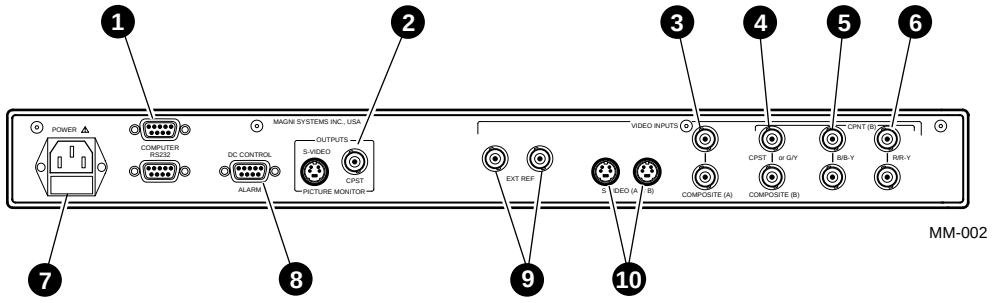


Figure 2-2. MM-410 Rear View

3. Product Overview (AVM-510A)

AVM-510A Series Automated Video Monitors

The Magni AVM-510A Series Automated Video Monitors (AVM-510A) are full-featured rasterizing waveform monitors and vectorscopes with comprehensive measurement and error reporting capabilities. Magni's patented raster display technology provides bright and sharp waveform and vector displays that resemble familiar CRT displays. All displays are routable so they can be viewed anywhere in a facility and on existing picture monitors. All AVM-510A Series monitors are dual standard (NTSC and PAL) and multi-format (Beta, MII, S-Video, EBU and GBR). The AVM-510A also saves space by occupying only a single rack unit (1 RU).

The AVM-510A is an active monitoring system with reporting, alarming, and numerical readouts on "Program Video" parameters. Automated Measurement sets provide graphic displays and numeric readouts on program video and standard broadcastVertical IntervalTest Signals (VITS) for simplified QC and testing. In any "Out of Limit" condition, the system highlights the pertinent parameter in red, activates a ground closure, and generates a report to a personal computer or printer with time code (VITC) or real time/date stamp.

The AVM-510A Series is ideally suited for site monitoring and remote control from a personal computer, or any other control system providing an RS-232 interface, over a Local Area Network (LAN) or Wide Area Network (WAN). Magni's Windows based LOGBOOK II software provides full front panel control and easy viewing of bit maps of VITS, waveform/vector displays and measurement screens.

AVM-510A Series Options

Two AVM-510A Series options are available:

- AVM-510A-T — adds a transmitter measurement set (Refer to Chapter 11)
- AVM-510A-C — adds component measurement sets and adds an SDM-550 interconnected digital measurement set (Refer to Chaper 12)

For those facilities in transition to Serial Digital 601, Magni also offers the SDM-560 Series, an innovative solution that builds on the AVM-510A analog platform. The SDM-560 provides Serial Digital and Composite inputs in a single unit with the features of the AVM-510A Series and new digital processing technologies.

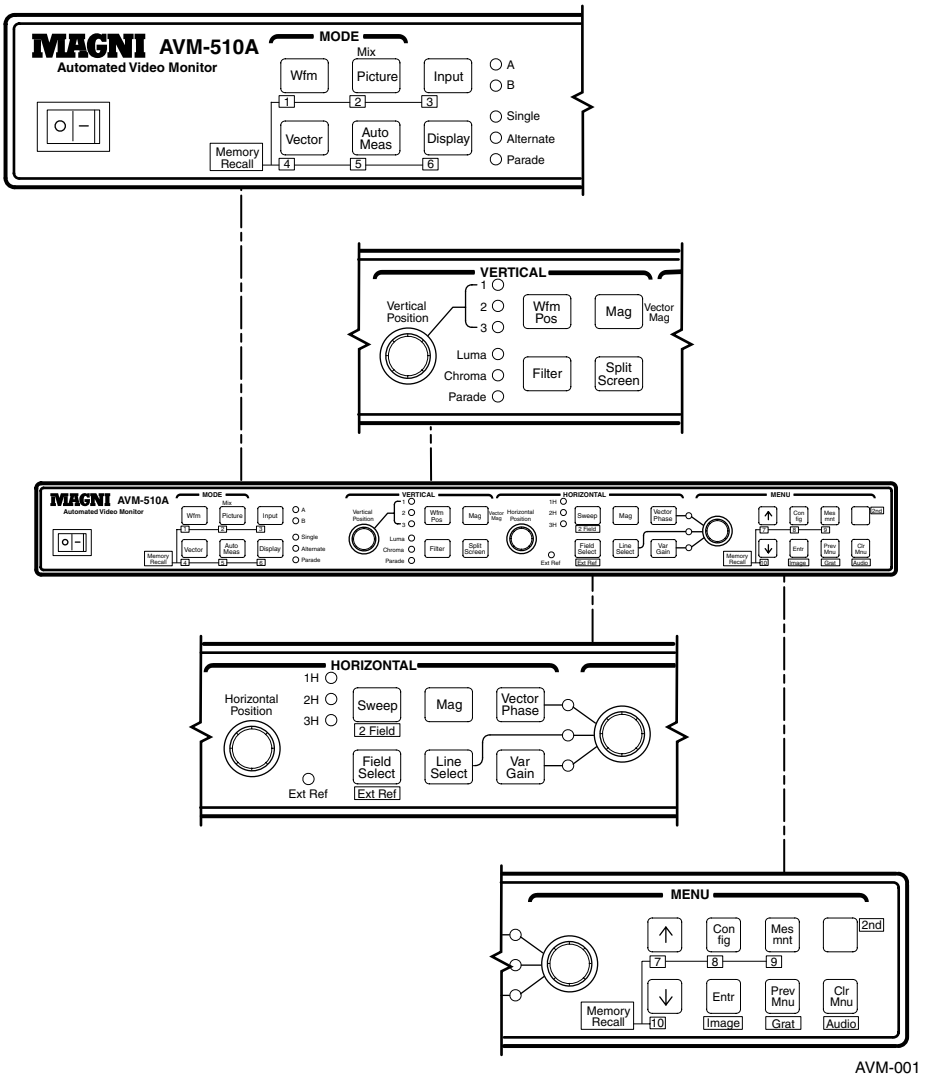
AVM-510A Features

- Works in all standard 525 and 625 analog formats: NTSC, PAL, SMPTE, EBU, Beta, MII, S-video, GBR (RGB)
- Waveform and vectors can be colored separately
- No distortion of display due to cathode ray tube aging
- Waveform and vector images can be captured and stored
- Captures transient events with its infinite persistence feature
- Display picture, waveform and vector together
- Alarm output for out-of-tolerance conditions
- Maximum sweep rate of 0.1 µs/division
- Displays SC/H Phase continuously
- Overlay two signals for comparison
- Control theAVM from a remote computer
- Control up to 31 AVMs from one computer
- Videotape waveforms and vectors
- Display audio measurement with waveform
- Adjustable audio limit setting
- Horizontal position “scrolls” waveform in magnified sweeps
- Input labels show selected format
- Remote control software can control other devices, such as video switchers
- Output display can be looped to several monitors
- Automatically switches between 525 and 625
- Displays waveform and vector together in different colors
- No burn in from steady, bright displays
- Variable persistence as well as intensity
- 10 memories to store front panel and other settings
- Automatically measures signal parameters with adjustable tolerance limits
- View the picture while monitoring signal measurements with Picture Guard
- Displays VITC (Vertical Interval Time Code) continuously
- Parade display of component signal parts or composite filters
- Adjust two signals to match using a picture display
- View waveforms remotely on a computer
- Print waveforms and vectors directly to a printer
- Display captured waveforms and compare with current waveform on one screen
- Stereo audio meters
- Adjustable audio limit settings
- Waveform turns red where amplitude exceeds adjustable limits
- Vector rotation “scrolls”
- Custom names for inputs, identifying the signal source
- PAL graticule can be in volts or percent

AVM-510A Front View

The following LEDs, indicators, buttons, switches (knobs) can be viewed from the front of the AVM-510A (see Figure 3-1).

NOTE: Some buttons on the front panel have two functions when used in conjunction with the **Blue** (2nd) button.



AVM-001

Figure 3-1. AVM-510A Front View

Power Switch

Powers the AVM-510A on and off.

Mode Buttons

The **Mode** buttons and the **Blue** button determine what the monitor displays: Wfm, Mix,Vector, Picture, AutoMeas (Automeasure), or Memory Recall.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Input Button

This button lets you choose three signal inputs (Input A: only, Input B: only, or both Input A: and Input B:).

Input Signal LEDs

Two Input Signal LEDs (Input A: only, Input B: only, or both Input A: and Input B:) light in conjunction with the three **Input** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Display Button

This button lets you choose between a Single, Alternate, or Parade view of component signals.

Display Button LEDs

Three Display LEDs (Single, Alternate, and Parade) light in conjunction with the three **Display** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Vertical Position Knob, LEDs, and Buttons

The vertical section of the front panel includes four buttons and one knob: Position (**Wfm Pos**), Vertical Magnification (**Mag**), Filter (**Filter**), and Split Screen (**Split Screen**), and a vertical positioning knob for vertical control options.

Position LEDs

Three Position LEDs (1, 2, and 3) light in conjunction with the three **Position** button selections.

Filter LEDs

Three Filter LEDs (Luma, Chroma, and Parade) light in conjunction with the three **Filter** button selections.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Horizontal Position Knob, LEDs, and Buttons

The horizontal section of the front panel includes six buttons and one knob: Line Select (**Line Select**) and Field Select (**Field Select**), Sweep (**Sweep**) and Horizontal Magnification (**Mag**), Vector Phase (**Vector Phase**), and Variable Gain (**Var Gain**), and a horizontal positioning knob for horizontal control options.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Sweep LEDs

Three Sweep LEDs (1H, 2H, and 2F) light in conjunction with the three **Sweep** buttons selections.

Rotary Switch (Knob)

The right knob is used to adjust the Vector Phase, Line Select, and Variable Gain functions of the AVM-510A. It can also be used to select and adjust items in the menu options.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Menu Buttons

These buttons let you configure the AVM-510A to fit your specific needs.

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the AVM-510A using the front panel buttons.

Blue Button Functions

Press the **Blue** button and then the button with the function outlined in a blue box. For example, memories are recalled by pressing the **Blue** button and then the button with the number of the memory outlined in blue.

AVM-510A Rear View

The following cable connectors can be viewed from the rear of the AVM-510A (see Figure 3-2).

Legend	Connector	Function
❶	RS-232 computer interface	A bi-directional communication interface that lets you control the AVM-510A by way of ASCII control codes.
❷	Picture monitor outputs	These outputs (S-video and composite) are available for a picture monitor display of a picture, waveforms, or signal status.
❸	Analog Audio inputs	Provides a fixed amplitude input through a 9-pin D-sub connector.
❹	Composite (A)	One switchable loop-through composite input.
❺	Composite (B), CPST or G/Y	One switchable loop-through composite, CPST, or G/Y component input.
❻	CNPT (B)	One switchable loop-through B/B-Y component input.
❼	CNPT (B)	One switchable loop-through R/R-Y component input.
❽	Power	Line voltage power connector (ac input).
❾	RS-232 modem interface	A bi-directional communication interface to modem that lets you control the AVM-510A over a standard telephone line.
❿	DC control/ alarm	DC Control – Lets you select any of the first four memories by grounding (earthing) pins 1 through 4. Alarm – When enabled, after an alarm delay, this open collector output (pin 5) goes to ground (earth) indicating an out-of-tolerance condition. *Refer to Chapter 4, "Installation," for additional information on this connector.*
⓫	External Reference	A composite analog external reference signal representing studio reference timing.
⓬	S-video (A or B)	One switchable loop-through S-video input. Can only be selected using the *Input* menu options.

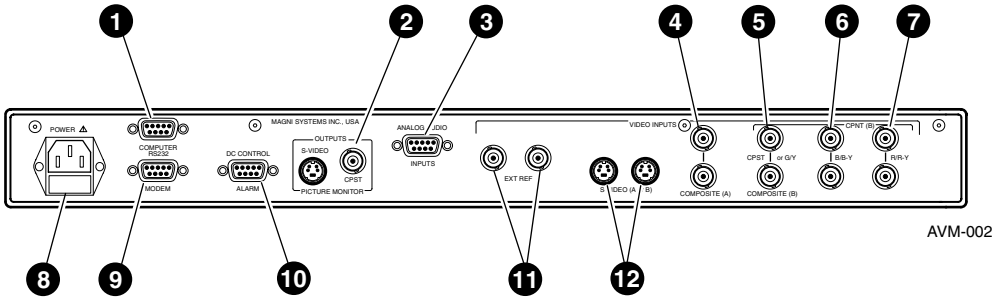


Figure 3-2. AVM-510A Rear View

4. Installation

Introduction

This chapter describes how to install the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A) and into a rack, how to connect cables to them, and how to configure them for your specific needs.

Installing the MM-410/AVM-510A into a Rack

The MM-410/AVM-510A mounts into any industry-standard rack. To install either one:

1. Install the rack ears onto the MM-410/AVM-510A.
2. Insert the MM-410/AVM-510A into the rack and then secure it using the supplied screws.
3. Connect the supplied power cord to an ac power source and to the back of the MM-410/AVM-510A.

CAUTION: The MM-410/AVM-510A produces very little heat and does not need a lot of air space. However, installing it in between two devices that produce a high amount of heat might cause overheating.

For optimal performance, keep the top cover airflow unrestricted.

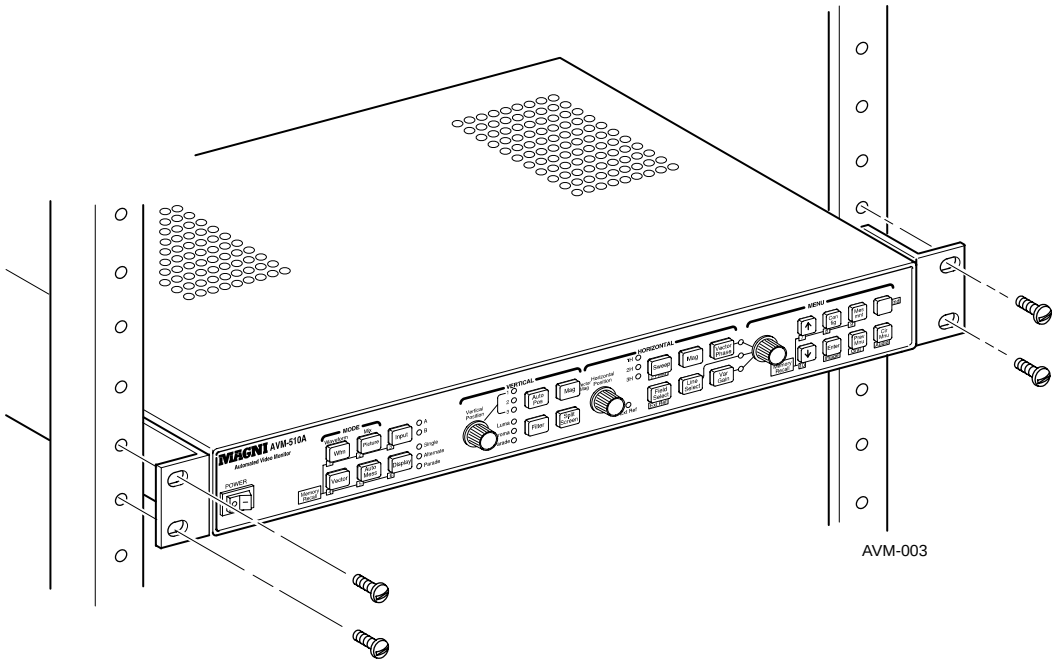


Figure 4-1. MM-410/AVM-510A Rack Installation (AVM-510A Shown)

Connecting Signal Input and Video Output Lines

Refer to Chapter 2, "Product Overview (MM-410) and Chapter 3, "Product Overview (AVM-510A)," for detailed descriptions and the locations of the MM-410/AVM-510A rear panel signal input and video output connectors.

Connecting Auxiliaries

The MM-410/AVM-510A has the following auxiliary connections:

- DC Control/Alarm
- Analog Audio Inputs (AVM-510A)
- RS-232 Computer (AVM-510A)
- RS-232 Modem (AVM-510A)

Refer to Chapter 2, "Product Overview (MM-410) and Chapter 3, "Product Overview (AVM-510A)," for detailed descriptions and the locations of the MM-410/AVM-510A rear panel signal input connectors.

DC Control

This 9-pin connector lets you select any of the first four front panel memory locations by grounding (earthing) any one of the four pins (DC Control). An indication of the selection of one of the first three memories is given by the grounding of three other pins (refer to the following table).

Pin	Description
1	Recall memory 1
2	Recall memory 2
3	Recall memory 3
4	Recall memory 4
5	Alarm out (AVM-510A)
6	Memory 1 out
7	Memory 2 out
8	Memory 3 out
9	Ground (earth)

Alarm (AVM-510A)

For the AVM-510A, pin 5 (alarm out) is dedicated to an alarm. Each time a screen shows an out-of-tolorance condition, this pin goes to ground (earth) if *MASTER ALARM* is enabled and after a delay is set in the *MASTER ALARM DELAY* menu option.

Analog Audio Inputs (AVM-510A)

Provides an input of 4 single-ended audio signals from selected inputs through a 9-pin D-sub connector.

Pin Number	Description
1	Analog input 1+ (balanced)
2	Analog input 2+ (balanced)
3	Analog input 3+ (balanced)
4	Analog input 4+ (balanced)
5	Ground
6	Analog input 1- (balanced)
7	Analog input 2- (balanced)
8	Analog input 3- (balanced)
9	Analog input 4- (balanced)

Analog inputs 1 through 4 are two-wire inputs.

RS-232 Computer (AVM-510A)

This is used for a direct connection to a computer. The computer can be running Logbook Software or communication software to control the AVM-510A from a remote location.

RS-232 Modem (AVM-510A)

This is used for a direct connection to a modem or printer. When connected to a modem, the AVM-510A can be controlled over telephone lines using a computer running Logbook Software. When connected to a printer, waveforms and vectors can be printed to paper.

Configuring the Inputs

As you become familiar with the MM-410/AVM-510A you will learn how flexible it is. The MM-410/AVM-510A lets you select a variety of settings to fit your specific needs. However, an important thing to remember is the format of the three signal inputs: Input A:, Input B:, and an external reference (see Figures 2-2 and 3-2). All inputs automatically switch between 525/60 and 625/50 formats.

- Input A: — Single loop through composite (NTSC or PAL) input signal (CPST-1).
- Input B: — Single loop through, configurable composite (NTSC or PAL), 3-wire component, or S-video input signal (CPST-2, SMPTE/EBU, BETA, GBR (RGB), MII).
- The external reference is a switchable loop-through composite 525/625 studio reference timing input (optional).

You can select Input A:, Input B:, or both Input A: and Input B: using the **Input** button on the front panel. You can also select an External Reference (Ext Ref) by pressing the **Blue** (2nd) button and then the **Field Sel** button (**Field Select** for the AVM-510A).

Refer to Chapter 5, "Front Panel Operation," for more information about configuring the MM-410/AVM-510A using the front panel buttons.

Saving Settings in Memory

After you configure the MM-410/AVM-510A, **you need to save it in memory**. The following procedure explains how to store an MM-410/AVM-510A configuration in a memory location using the *Config* (Configure) menu.

1. Select the desired signal input by pressing the **Input** button or through the *Config* menu options.
2. Configure the MM-410/AVM-510A for a desired mode.
3. Using the Vertical and Horizontal Position knobs, center the display.
4. Press the **Config** button to access the *Config* menu.
5. Using the arrow buttons, select *MEMORIES* and then press the **Enter** button.
6. Using the **Arrow** buttons, select *STORE MEMORY*.
7. Using the knob, select the desired memory location (1 through 10).

8. Press the **Enter** button to store that memory.
9. Press the **Clr Mnu** button to exit.
10. If you intend to view signals of several different formats, save them in other available memory locations using steps 1 through 8.

    NOTE: Settings for other formats or standards are also stored. For example, (1) the *+V SWITCH ON/OFF* setting for PAL even when memory is stored for NTSC and (2) limit settings for both standards are stored.

When a configuration is saved in a memory location, all MM-410/AVM-510A functions are stored in that memory. This includes items that are not displayed. For example, a waveform and measurement setup when a picture is displayed. For best results, recall a memory location, make a modification, and then store the new settings in another memory location.

To recall any stored memory at any time, press the **Blue** (2nd) button and then one of the Memory Recall buttons (for memories 1 through 10).

NOTE: You can also recall the first four memory locations through the ground closures of the DC CONTROL/ALARM connector. (see Figures 2-2 and 3-2).

Refer to Chapter 6, "Operating the MM-410/AVM-510A," for more information about using the Config menu to save memory locations.

Notes

5. Front Panel Operation

Introduction

This chapter explains how to operate the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A) by using its front panel buttons and rotary switches (knobs). The MM-410/AVM-510A front panel is made up of four main sections (see Figures 5-1 and 5-2):

- Mode
- Vertical
- Horizontal
- Menu

The remainder of this chapter describes the operational characteristics of each one. Also included is a monitor display explanation and sections on the *Config* (Configure) and *Mesmnt* (Measurement) Menu structures along with some basic rules for their many uses.

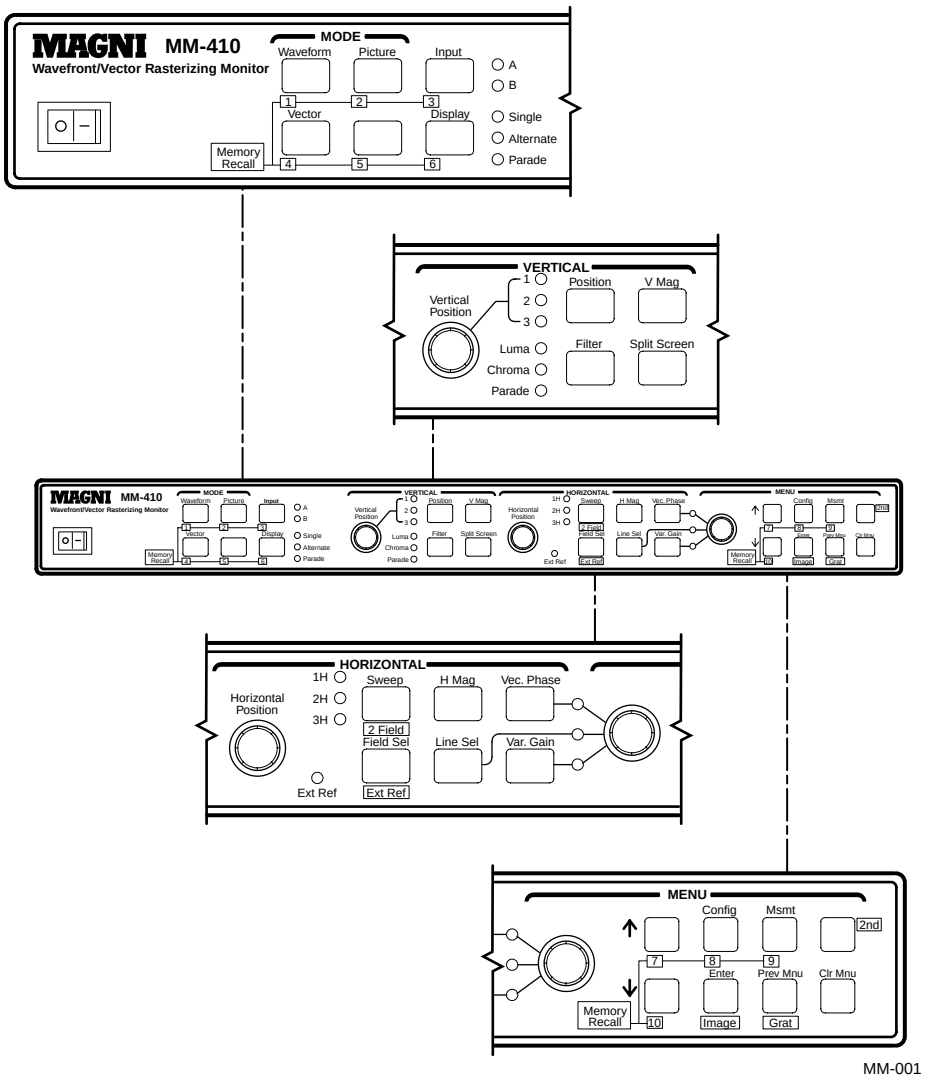
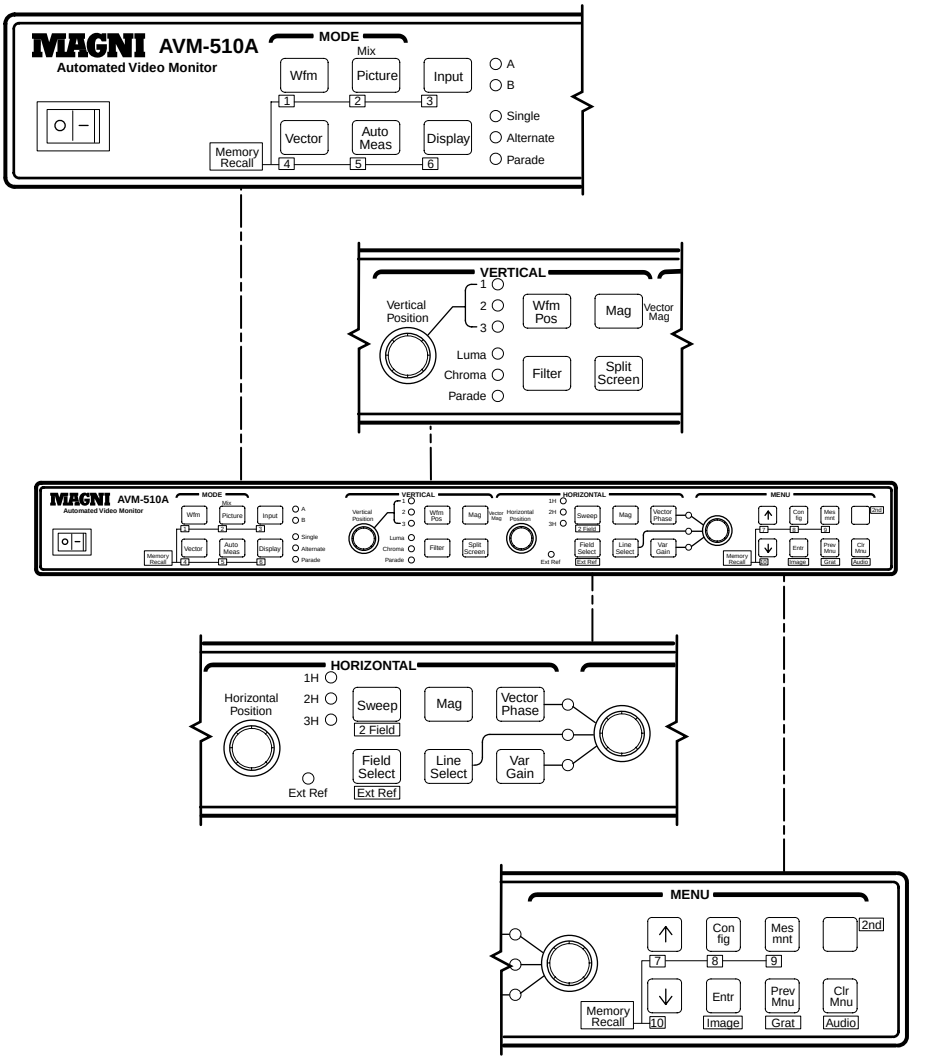


Figure 5-1. MM-410 Front View



AVM-001

Figure 5-2. AVM-510A Front View

Monitor Display Explanation

Figure 5-3 shows what you can see on a monitor display as you operate the MM-410/AVM-510A using the front panel buttons and knobs. The table that follows explains each of the display areas.

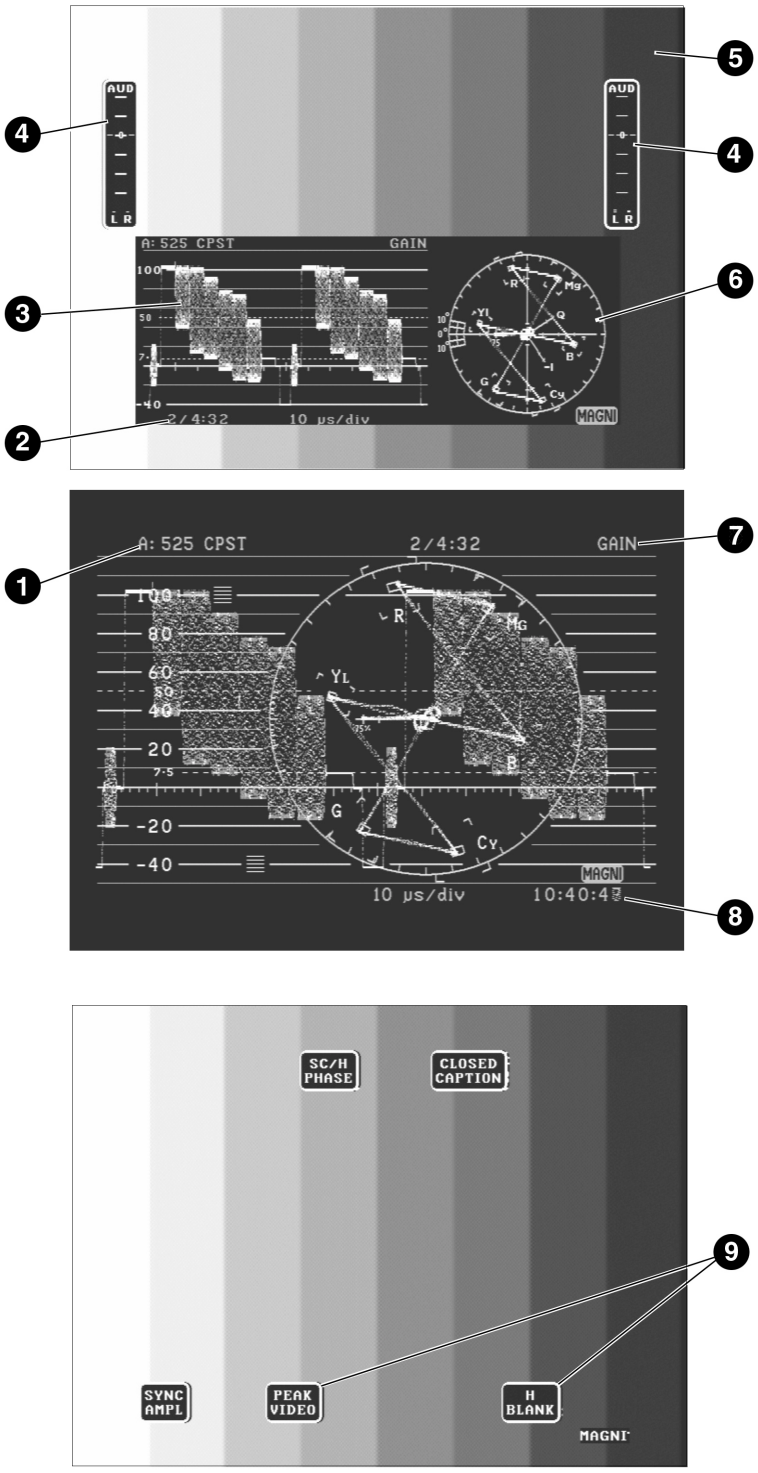


Figure 5-3. Monitor Display Explanation

Figure Legend	Description
❶	Indicates the selected and displayed input signal A or B, the displayed signal system 525 (NTSC) or 625 (PAL), and the displayed signal format digital for the A or B input.
❷	Field and Line – Field and line number display.
❸	Waveform – Waveform display.
❹	Audio Meters – Analog audio metering.
❺	Picture – Picture display.
❻	Vector – Vector display.
❼	Gain – Variable gain display (waveform/vector).
❽	Time Readout – VITC Time Code or Real Time Clock (RTC) readout.
❾	Picture Guard – Picture Guard icons.

Mode

These buttons determine what the monitor displays: Waveform, Picture, Vector, Single, Parade, or Alternate (ALT). The following table lists the functions of the Mode buttons.

Button	Function
Waveform (Wfm AVM-510A)	Displays a waveform of a selected signal input.
Vector	Displays a vector of a selected signal input. Press the **Vector** button twice to view a vector and waveform at the same time.
Picture	Displays a picture of a selected signal input. Press the **Picture** button twice to view a picture overlaid with the previous display.
Auto Meas (AVM-510A)	Displays an automeasure screen. Press the **Auto Meas** button twice to view a Picture Guard display.
Input	Lets you select an Input A: signal input, an Input B: signal input, or both an Input A: and Input B: signal input.
Display	Lets you select a Single, Alternate, or Parade view of component signals.

Refer to Chapter 7, "Viewing Waveforms, Vectors, and Pictures," for more information on these types of displays.

Vertical

These buttons let you manipulate and vertically position waveforms on a display monitor. The following table lists the functions of the Vertical buttons and knob.

Button/Knob	Function
Vertical Position	Positions the waveform on a display monitor. Use this knob to move the waveform up or down. Also moves the three parts of a component waveform separately, depending on the state of the **Position** button and its associated LEDs (**Wfm Pos** for the AVM-510A).
Position	Selects the corresponding component of a parade filter, waveform, or S-video waveform (toggles between position 1, 2, 3, or all three). When used in conjunction with the Vertical Position knob, allows vertical positioning of each waveform. An LED lights when a position is selected.
Mag/V Mag	Vertically magnifies a waveform 2.5 times. For the AVM-510A, the words "Vector Mag" at the side of the **VMag** button indicate that vectors are also magnified by a 2.5 factor (**Mag** for the AVM-510A**).** A "VMAG" indicator appears in the waveform and vector displays to alert you that the display is not normal.
Filter	Used in conjunction with composite signals (although the low pass Luma filter is available for component signals). Used to toggle between the luminance filter and chrominance filter or can be used to parade three waveforms (flat or no filter, luma filter, and chroma filter). If the display is both a vector and a waveform, pressing the **Filter** button engages the Luma filter on the waveform so you can see the chroma in the vector (this is the only filter available in this display mode).
Split Screen	Used to toggle through the following displays: 1. Waveform and vector. Shown in a small window at the bottom of the picture. 2. Picture Guard (AVM-510A). A picture display that alerts you to out-of-tolerance elements of the signal. 3. A/Ref Split. Shows the video from the Input A: and the external reference input in alternating horizontal bands, used to match two signals without waveform or vector displays.

Refer to Chapter 7, "Viewing Waveforms, Vectors, and Pictures," for more information on these types of displays.

Horizontal

These buttons let you manipulate and horizontally position waveforms on a display monitor. The following table lists the functions of the Horizontal buttons and knob.

Button/Knob	Function
Horizontal Position	Positions the waveform on a display monitor. Use this knob to move the waveform left or right. The Horizontal position knob also has a scrolling function when used in magnified sweep or vector phase mode. While in these modes, to continuously scroll a waveform from left to right, turn the knob counterclockwise fast. Once the correct position is reached, turn the knob clockwise or counterclockwise to stop the scrolling. You can now make fine adjustments to the postion of the waveform.
Sweep	Lets you show one line of a signal input (1H) or two lines of a signal input (2H). When selected, the corresponding LED lights. Note that when in 1H mode, the second line of a signal input is to the right and can be seen by turning the Horizontal Position knob.
Blue + Sweep (2 Field)	Displays two fields of a signal input. When selected, the corresponding LED lights (2F).
Field Sel (Field Select AVM-510A)	Changes the field that triggers the 2F (two field) display. Note that this selection is only noticable in a two-field display or when the **Line Sel** button is used (**Line Select** for the AVM-510A).
Blue + Field Sel (Ext Ref)	Displays an externally referenced signal input (Ext Ref). When selected, the corresponding LED lights.
H Mag (Mag AVM-510A)	Magnifies the sweep horizontally.
Line Sel	Displays two lines from an even or odd numbered field. To choose the line you want to monitor, press the **Line Sel** button and then rotate the Menu knob to the right. When selected, the corresponding LED lights. Note that the selected line is identified by numbers at the top of a display. For example, 1/3:27 means Fields 1 and 3 (odd), Line 27.
Vec. Phase (Vector Phase AVM-510A)	Lets you rotate a vector display using the Menu knob. When selected, the corresponding LED lights.

continued

Button/Knob	Function
Var. Gain	Reduces a signal input (waveform and vector) by a size factor of 0.7 or increases a signal input (waveform and vector) by a size factor of approximately 1:2. When selected, the corresponding LED lights. You can also use Var (Variable) Gain with V Mag if you need to see a more detailed waveform or vector. When selected, the word GAIN appears at the top-right of the display. **Note:** If you have both Line Sel and Vec. Phase selected, you can press the buttons back and forth to engage the knob. You can also select Vec. Phase, Line Sel, and Var. Gain. The corresponding LED indicates which selection the knob can adjust. The display also indicates which selection is active. The first push of the button activates the knob. The second push of the same function deactivates that function.

Refer to Chapter 7, "Viewing Waveforms, Vectors, and Pictures," for more information on these types of displays.

Menu

One main button (**Config**) is available on the front panel for both the MM-410 and the AVM-510A. A second button (**Mesmnt**) is also available for the AVM-510A only. These buttons let you access the following *Configure* and *Measurement* menu options (see Figures 5-1 and 5-2).

Configure menu options include:

- INPUT
- DISPLAY
- VECTOR
- REFERENCE
- PICT. REF
- OTHER
- MEMORIES

Measurement menu options include:

- SELECT SET
- RESPONSE TIME
- NOISE LINE
- TIME READOUT
- REPORT
- WAVEFORM READOUTS
- AUDIO OPTIONS
- MULTIBURST ID

Refer to Chapter 6, "Operating the MM-410/AVM-510A," for more information about the Config and Mesmnt menu options.

How the Menu Works

Following are some basic rules about how the menu works.

- You do not have to exit one menu to access another. Each time you access the *Config* or *Mesmnt* menu, the available selections always start in the top level menu.
- The **Prev Mnu** button lets you see the menu that was previously selected. As you scroll through the menu options, the **Prev Mnu** button moves you to the previous menu. It does not erase any selections you have made.
- The **Clr Mnu** button closes the menu completely. It does not erase any of the selections you have made.

- Any menu option selected takes effect immediately. You must de-select a menu option to erase it.
- A blue, highlighted cursor indicates the place in the menu structure. You can move the cursor using the **Up** and **Down** arrow buttons.
- Menu entries in all capital letters indicate that there are sub-menus below that entry.
- The **Blue** button is used for quick access to the functions available for the MM-410/AVM-510A. To use the **Blue** button, simply press it and then press the button that relates to the function you want to select.

  Refer to "Quick Access to Commonly Used Functions" for a listing of the Blue button functions.

Choosing Menu Options

You select and choose options in the *Configure* or *Measurement* menu using the associated menu buttons and a knob. You access the *Configure* menu by pressing the **Config** button. For the AVM-510A, you access the *Measurement* menu by pressing the **Mesmnt** button. You can then use the **Up** and **Down** arrow buttons to move the cursor through the menu selections. The knob is used to make sub-selection adjustments to a menu selection.

Pushing the **Enter** button has two effects, depending on what you have highlighted at the time the button is pressed (**Entr** for the AVM-510A). Press the **Config** button, select an input, and then press the **Enter** button to see the following example:

- If the blue highlighted cursor is on the *INPUT* menu option that has choices highlighted in white, such as *SLOW* and *OFF*, pressing the **Enter** button will toggle through these choices (see Figure 5-4).
- Turning the knob also changes the values or selections for menu options. For example, if the blue highlighted cursor is on the *INPUT* menu option that has choices highlighted in white, such as *SLOW* and *OFF*, rotating the knob will also toggle through these choices.

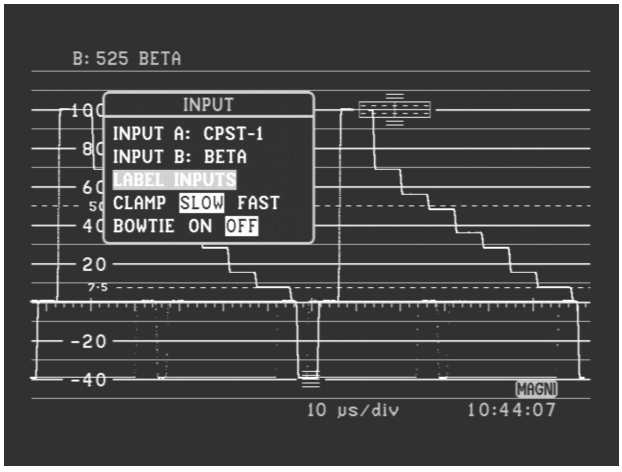


Figure 5-4. Input Screen

You can exit a menu using several methods:

- Pressing the **Prev Mnu** button closes the current menu and moves you back to the previous menu. If you press it enough times, you will exit all menus.
- Pressing the **Clr Mnu** button closes all menus immediately.
- If you are down several layers in the menus, pressing the **Config** button once brings you to the top *Configure* menu. Pressing it again closes the *Configure* menu.

Most menu options that are selected take effect immediately. For example, if you want to change the AVM-510A *COLOR LIMITS*, you will see the effect right away as long as you are displaying the limits at that time.

To display the AVM-510A *COLOR LIMITS* shown in Figure 5-5:

1. Select Input A: or Input B: as the input signal.
2. Press the **Mesmnt** button to access the *Measurement* menu.
3. Select *SELECT SET*, and then select *COLOR SETUP*.
4. Select *COLOR LIMITS* and then press the **Enter** button.

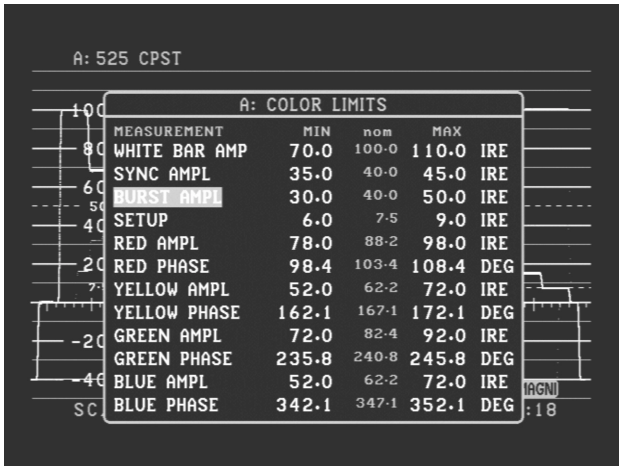

A: 525 CPST
A: COLOR LIMITS
MEASUREMENT MIN nom MAX
WHITE BAR AMP 70.0 100.0 110.0 IRE
SYNC AMPL 35.0 40.0 45.0 IRE
BURST AMPL 30.0 40.0 50.0 IRE
SETUP 6.0 7.5 9.0 IRE
RED AMPL 78.0 88.2 98.0 IRE
RED PHASE 98.4 103.4 108.4 DEG
YELLOW AMPL 52.0 62.2 72.0 IRE
YELLOW PHASE 162.1 167.1 172.1 DEG
GREEN AMPL 72.0 82.4 92.0 IRE
GREEN PHASE 235.8 240.8 245.8 DEG
BLUE AMPL 52.0 62.2 72.0 IRE
BLUE PHASE 342.1 347.1 352.1 DEG

Figure 5-5. Color Limits Screen

Quick Access to Commonly Used Functions

The **Blue** button provides quick access to certain functions, such as status recall. Note that any **Blue** button function is also available through the main menus.

The options that the **Blue** button can control are the ones in blue boxes on the front panel. To execute any option labeled in a blue box, press the **Blue** button and then the button you want. The following table lists the available options.

Button	Function
Waveform	Recall memory 1.
Picture	Recall memory 2.
Input	Recall memory 3.
Vector	Recall memory 4.
***** **(Auto Meas AVM-510A)**	Recall memory 5.
Display	Recall memory 6.
Up Arrow	Recall memory 7.
Config	Recall memory 8.
Msmt (Mesmnt AVM-510A)	Recall memory 9.
Down Arrow	Recall memory 10.
Enter	Recall the currently selected image to the display.
Prev Mnu	Switch the Added Marks boxes on and off. Note that these boxes are visible only at the 2H Mag sweep rate.
Clr Mnu (AVM-510A)	Audio – Toggles the audio meters on and off for the selected signal input.
Field Sel	Switch between External Reference and Internal Reference.
Sweep	Display a waveform as a two-field display.

* This button is blank on the MM-410.

The **Blue** button also has an escape function under certain conditions. For example, if you quickly press the **Blue** button twice, the following message flashes on the monitor screen:

```
Press Enter for FACTORY RESET
```

CAUTION: Do not press the **Enter** button until you read the following section "Factory Reset." Failure to do so can cause loss of memory data.

Factory Reset

To reset the MM-410/AVM-510A back to its factory default settings:

1. Quickly press the **Blue** button twice.

   Afterwards the following message appears on the monitor screen:

   ```
   Press Enter for FACTORY RESET
   ```

2. Press the **Enter** button to reset or any other key to cancel the reset.

   If you do not press the **Enter** button after a period of time, the reset is automatically canceled.

Notes

6. Operating the MM-410/AVM-510A

Introduction

This chapter describes how to operate the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A). By now you should have the MM-410/AVM-510A installed and configured for your specific needs. Using the information provided in this chapter, you can now select, monitor, automeasure, and report the appropriate display options available in the *Config* (Configure) and *Mesmnt* (Measurement) menus.

This chapter also describes how to:

- Use intensity and persistence
- Controlling the AVM-510A with a computer
- Identify waveforms
- Display SC/H phase and time codes
- Getting information to and from the AVM-510A
- Print waveforms and vectors (AVM-510A):
  - Intensity, persistence, and print density controls
- Videotape waveforms
- Memory recall with external switches
- External alarm and memory status

Config Menu

The *Config* menu contains the display portion of the MM-410/AVM-510A. It lets you view the input, display, vector, memory, time, alarm settings, and serial port options shown in Figure 6-1. The following sections describe each of the *Config* menu options.

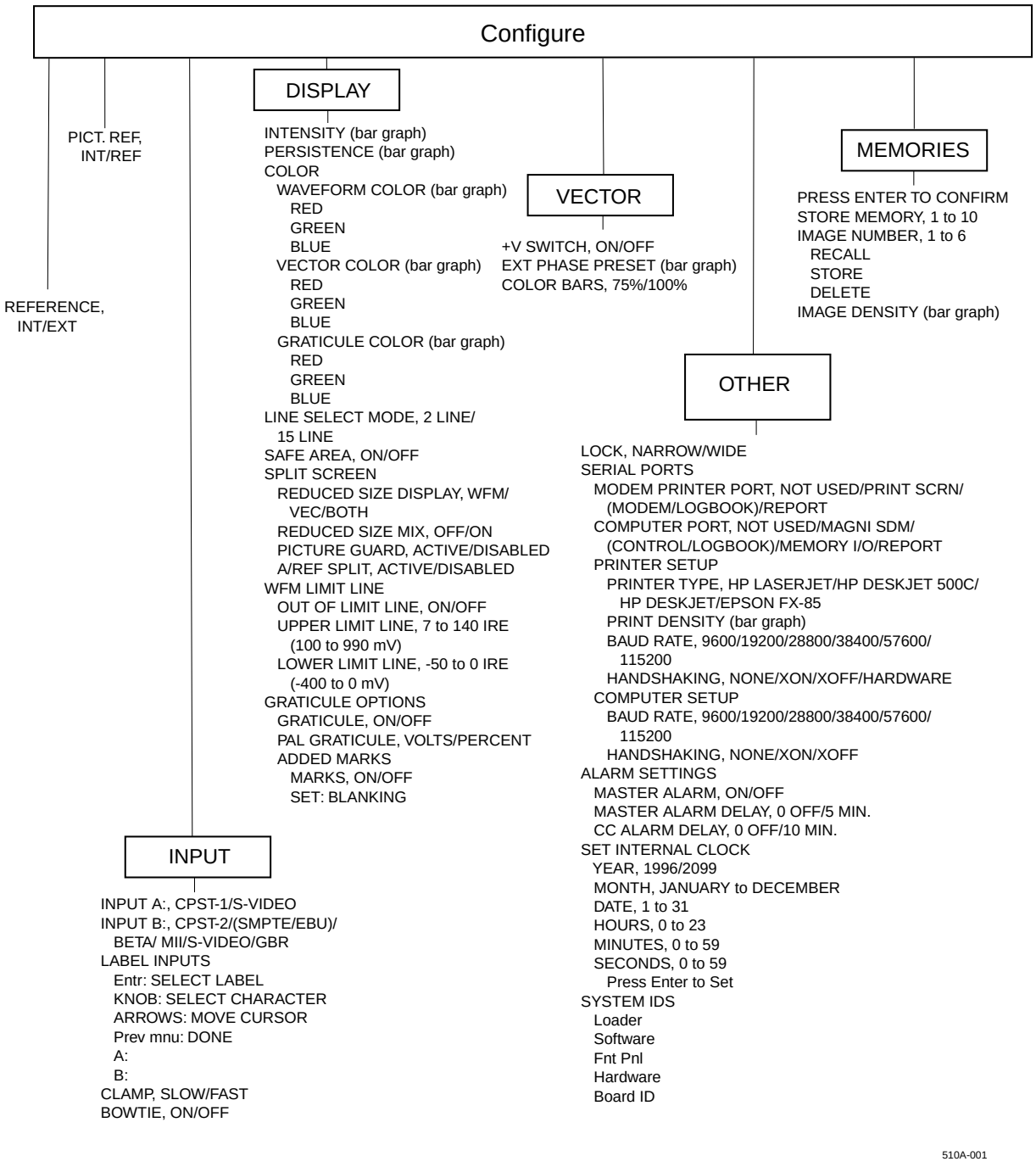


Figure 6-1. Config Menu Options

INPUT Sub-Menu

This section describes each of the *INPUT* sub-menu options. Input A: and Input B: lets you select a displayed input and the format of the selected input.

INPUT A:

Lets you select either a CPST-1 (Composite) or S-video signal input for display when Input A: is selected.

INPUT B:

Lets you select the CPST-2 (Composite), SMPTE/EBU, BETA, MII/S, S-video, or GBR signal input for display when Input B: is selected.

LABEL INPUTS

Lets you label the line display (❶, Figure 5-3) for a selected signal input. If left blank, the signal input lines display the factory defaults.

CLAMP:

Lets you switch between a slow clamp to see or a fast clamp to remove low frequency components of a signal.

BOWTIE

Lets you turn on/off a bowtie display. Note that this display is Y minus R-Y paraded with Y minus B-Y in component waveform and minus B in composite waveform.

DISPLAY Sub-Menu

This section describes each of the *DISPLAY* sub-menu options.

INTENSITY

Lets you see and change the intensity level of a display in the form of a horizontal bar graph.

PERSISTENCE

Lets you see and change the persistence level of a display in the form of a horizontal bar graph.

COLOR

WAVEFORM COLOR

Lets you select and set Red, Green, and Blue horizontal bar graphs for the WAVEFORM display color.

VECTOR COLOR

Lets you select and set Red, Green, and Blue horizontal bar graphs for the VECTOR display color.

GRATICULE COLOR

Lets you select and set Red, Green, and Blue horizontal bar graphs for the GRATICULE display color.

LINE SELECT MODE

Lets you select either a 2 line or 15 line display.

SAFE AREA

Lets you turn on/off the safe title and safe action areas of a display. Safe title is limited to 90% of the display (no part of the NTSC/PAL display can be closer than 10% to the edge). Safe action is limited to 95% of the screen display (no part of the NTSC display can be closer than 5% to the edge).

SPLIT SCREEN

REDUCED SIZE DISPLAY

Selects waveform, vector, or both for display in split screen mode.

REDUCED SIZE MIX

Allows a mix of a picture and a waveform in the WFM cutout area.

A/REF SPLIT

Enables the A/Ref Split option when the **Split Screen** button is pressed three times. Note that A/Ref Split is a display of horizontal bars of A and Ref so related timing and amplitude settings can be compared.

PICTURE GUARD (AVM-510A)

Enables the Picture Guard option when the **Split Screen** button is pressed twice.

WFM LIMIT LINE

OUT OF LIMIT LINE

Lets you turn on/off the WFM (waveform) out of limit line.

UPPER LIMIT LINE

Lets you set and display the upper CPST/S-video limits between 7 to 140 IRE/100 to 990 mV above which the displayed waveform turns color.

LOWER LIMIT LINE

Lets you set and display the lower CPST/S-video limits between -50 to 0 IRE/-400 to 0 mV below which the displayed waveform turns color.

GRATICULE OPTIONS

GRATICULE – Lets you turn on/off a graticule display.

PAL GRATICULE – Lets you switch between a volts or percent PAL graticule.

ADDED MARKS – Lets you turn on/off the added marks of a display. Also lets you set blanking marks displayed in 2H Mag.

VECTOR Sub-Menu

This section describes each of the *VECTOR* sub-menu options.

+V SWITCH

Lets you turn on/off the +V switch for a vector display. When off, a PAL type vector is displayed with 12 boxes. When On, an NTSC type vector is displayed with 6 boxes.

EXT PHASE PRESET

Lets you set (by horizontal bar graphs) the external phase presets for the following options to correct each phase-to-graticule:

- INPUT A: CPST-1/S-video
- INPUT B: CPST-2/SMPTE/EBU/BETA/MII/S-video/GBR

COLOR BARS

Lets you select between a 75% or 100% color bar display.

OTHER Sub-Menu

This section describes each of the *OTHER* sub-menu options.

LOCK

Lets you select a NARROW or WIDE lock for unstable signals.

SERIAL PORTS (AVM-510A)

MODEM PRINTER PORT

Lets you select between PRINT SCREEN, MODEM/LOGBOOK, REPORT, or NOT USED.

If a modem is connected to your AVM-510A, you can use it to transfer measurement report file data and then print it via a remote computer.

COMPUTER PORT

Lets you select between MAGNI SDM, CONTROL/LOGBOOK, MEMORY I/O, REPORT, or NOT USED.

If a computer is connected to your AVM-510A, you can use it to store measurement report files or to print out measurement reports.

PRINTER SETUP

Lets you select and display the following options:

PRINTER TYPE – Display the type of printer connected to a computer (HP DeskJet 500C, HP Laser Jet, HP DeskJet, or Epson FX-85.

PRINT DENSITY – Lets you see the print density of a display in the form of a horizontal bar graph.

BAUD RATE – Lets you select a baud rate for data transfers between the AVM-510A and a computer. Available baud rates: 9600, 19,200, 28,880, 38,400, 57,600, and 115,200.

HANDSHAKING – If a computer is connected to your AVM-510A, you can select either the handshake protocol XON/XOFF or HARDWARE. Otherwise, select *NONE*.

COMPUTER SETUP

Lets you select and display the following options:

BAUD RATE – Lets you select a baud rate for data transfers between the AVM-510A and a computer. Available baud rates: 9600, 19,200, 28,880, 38,400, 57,600, and 115,200.

HANDSHAKING – If a computer is connected to your AVM-510A, you can select the handshake protocol XON/XOFF. Otherwise, select *NONE*.

Press Enter To Print Waveform

Lets you print a waveform when a waveform is selected and the **Enter** button is pressed.

ALARM SETTINGS (AVM-510A)

MASTER ALARM (ON or OFF)

ON (enables) or OFF (disables) the alarm output on pin 1 of the DC CONTROL/ALARM connector.

MASTER ALARM DELAY

Controls the response delay of the alarm [0 (OFF) to 5 minutes].

CC ALARM DELAY

Controls the response delay of the CC alarm [0 (OFF) to 10 minutes].

SET INTERNAL CLOCK

Lets you set the internal clock of the MM-410/AVM-510A. The selections are: *YEAR, MONTH, DAY, HOURS,* and *MINUTES,* and *SECONDS.* Select *Press To Set* and then the **Enter** button to save the internal clock settings.

SYSTEM IDS

Lets you display the MM-410/AVM-510A system software and hardware identification information for: Loader, Software, Fnt Pnl, Hardware, and Board ID.

MEMORIES Sub-Menu

This section describes each of the *MEMORIES* sub-menu options.

STORE MEMORY

Lets you store up to 10 separate waveform, vector, or picture setup configurations. Select *STORE MEMORY*, turn the knob to select the memory number, and then press the **Enter** button to store the settings in memory.

IMAGE NUMBER

Lets you Recall, Store, and Delete up to 6 separate waveform, vector, or picture memory locations. Select *RECALL, STORE,* or *DELETE* and then press the **Enter** button to confirm.

IMAGE DENSITY

Lets you see and set the image density of a display in the form of a horizontal bar graph.

REFERENCE

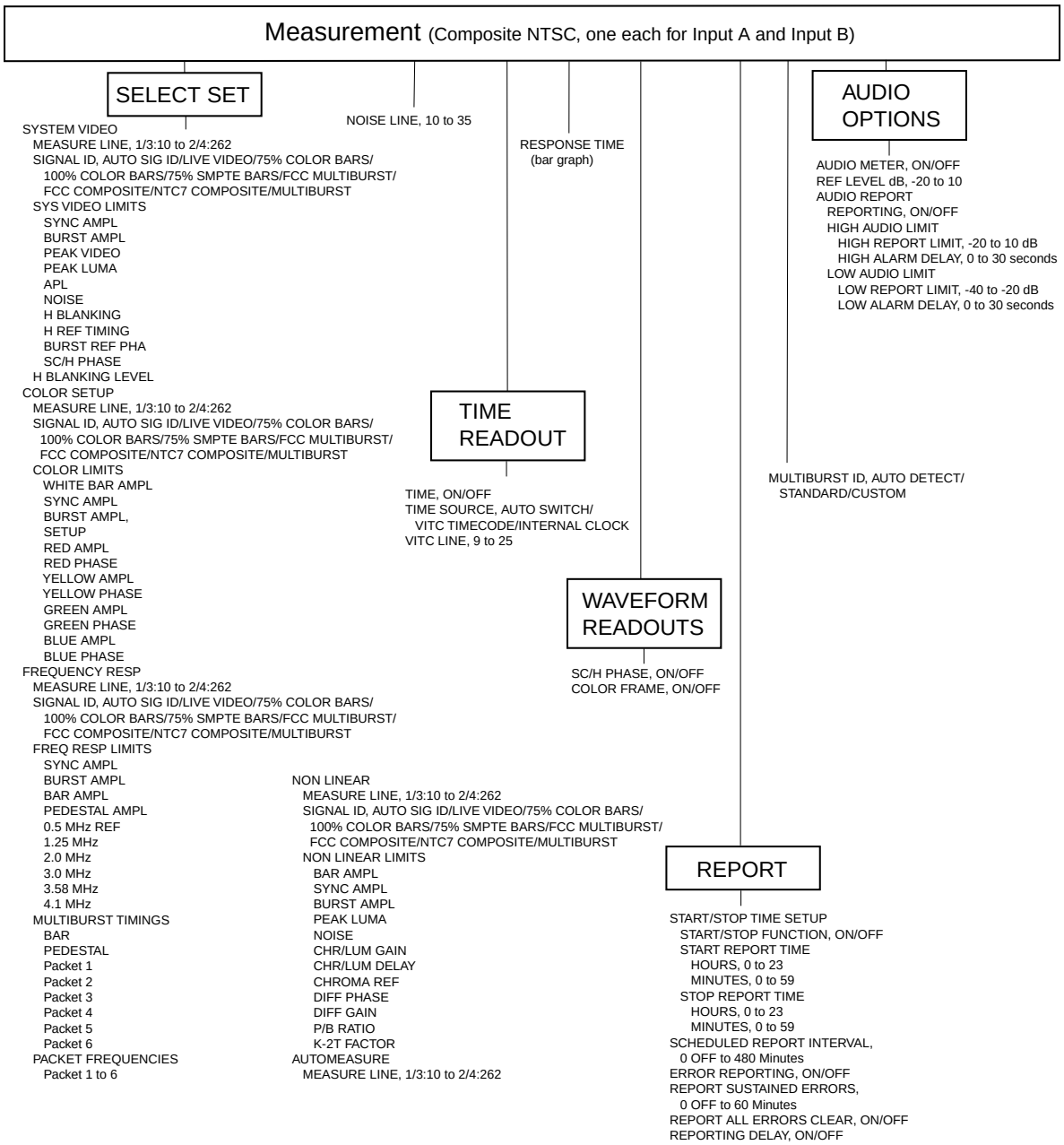
Lets you select between an internal (INT) or external (EXT) signal reference for synchronization.

PICT. REFERENCE

Lets you select an internal (INT) or external (EXT) signal reference (REF) when any picture is displayed. Note that if you select the *REF* option, the signal reference will be the same as what was selected in the REFERENCE menu option.

Mesmnt Menu

The *Mesmnt* menu contains the measurement portion of the MM-410/AVM-510A (see Figure 6-2 and Figure 6-3). The *Mesmnt* menu lets you view the A and B input (digital) measurement options. The following sections describe each of the *Mesmnt* menu options.



Note: Refer to "Parameters: Range, Accuracy, and Limits," in Chapter 10, for associated nominal values

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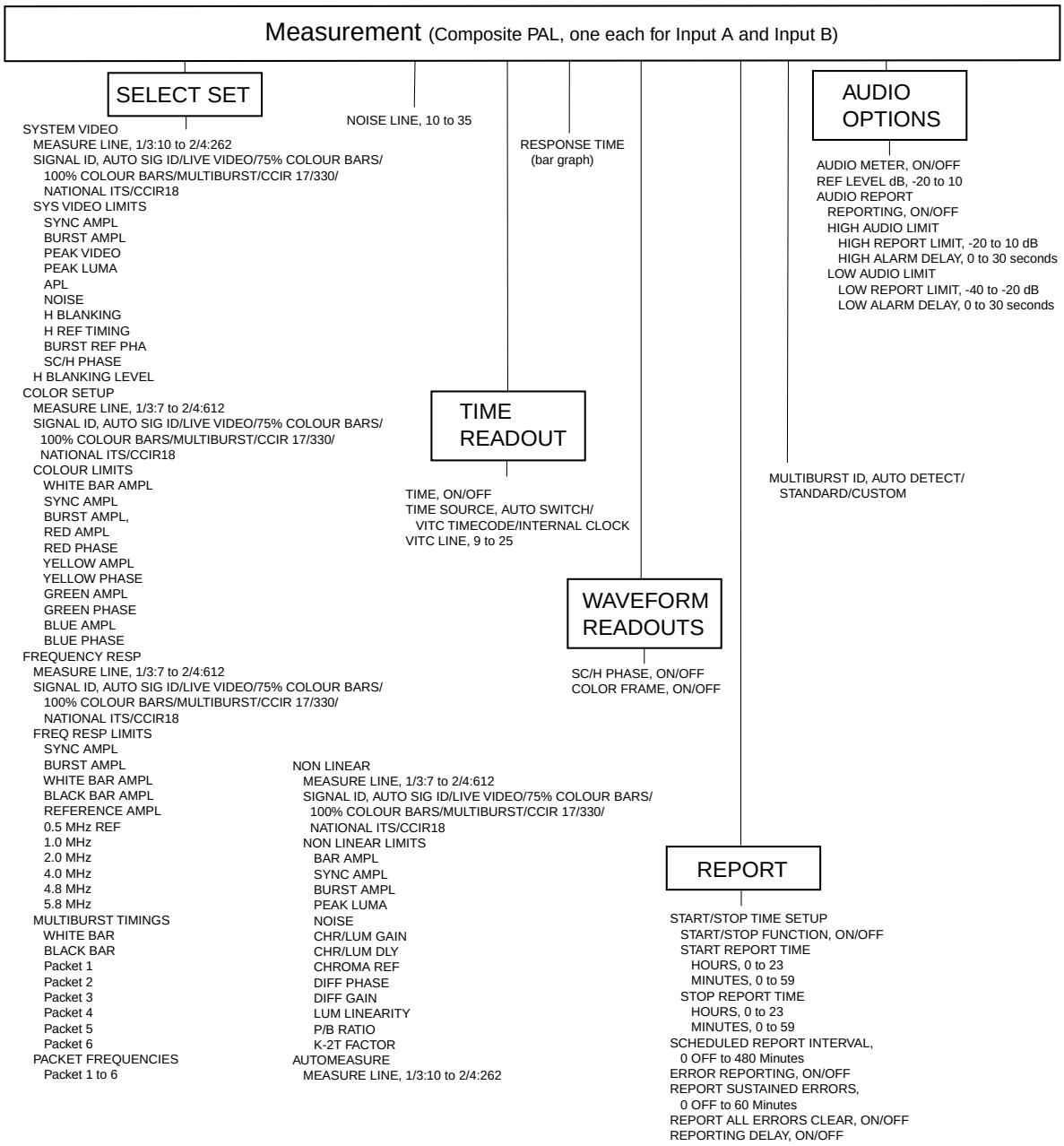
Figure 6-2. A and B Measurements (Composite NTSC)



Note: Refer to "Parameters: Range, Accuracy, and Limits," in Chapter 10, for associated nominal values

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Figure 6-3. A and B Measurements (Composite PAL)

TIME READOUT Sub-Menu

The *TIME READOUT* sub-menu options let you select the TIME, TIME SOURCE, or VITC LINE options.

TIME

Lets you turn ON/OFF the internal clock.

TIME SOURCE

Lets you display one of the following time sources: VITC TIMECODE or INTERNAL CLOCK. The TIME SOURCE option also lets you automatically switch between VITC TIMECODE or INTERNAL CLOCK by selecting *AUTO SWITCH*.

VITC LINE

Lets you select a VITC line between 9 and 25.

Refer to "Displaying SC/H Phase and Time Codes," described later in this chapter, for more information about Time Code options.

WAVEFORM READOUTS Sub-Menu

The *WAVEFORM READOUTS* sub-menu options let you select the SC/H PHASE and/or COLOR FRAME options.

SC/H PHASE

Lets you turn ON/OFF SC/H PHASE.

COLOR FRAME

Lets you turn ON/OFF COLOR FRAME.

Refer to "Displaying SC/H Phase and Time Codes," described later in this chapter, for more information about the SC/H PHASE and COLOR FRAME options.

SELECT SET Sub-Menu (AVM-510A, Composite NTSC)

The *SELECT SET* sub-menu options let you select SYSTEM VIDEO, COLOR SETUP, FREQUENCY RESP, NON LINEAR, or AUTOMEASURE (see Figure 6-2). When AUTOMEASURE is selected the AVM-510A automatically enables the proper measurement set for the line selected in the signal under test. The selected set appears in the upper-left corner of the AUTOMEASURE display screen.

SELECT SET Sub-Menu (AVM-510A, Composite PAL)

The *SELECT SET* sub-menu options let you select SYSTEM VIDEO, COLOR SETUP, FREQUENCY RESP, NON LINEAR, or AUTO MEAS SET (see Figure 6-3). When AUTO MEAS SET is selected the AVM-510A automatically enables the proper measurement set for the line selected in the signal under test. The selected set appears in the upper-left corner of the AUTO MEAS SET display screen.

SYSTEM VIDEO

Lets you select the MEASURE LINE, SIGNAL ID, SYS VIDEO LIMITS, or H BLANKING LEVEL options.

MEASUREMENT LINE

Lets you select a line (1/3:10 to 2/4:262) that measurements can be taken from.

SIGNAL ID (NTSC)

Lets you select LIVE VIDEO, 75% COLOR BARS, 100% COLOR BARS, 75% SMPTE BARS, FCC MULTIBURST, FCC COMPOSITE, NTC7 COMPOSITE, MULTIBURST or AUTO SIG ID. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTOMEASURE display screen.

SIGNAL ID (PAL)

Lets you select AUTO SIG ID, LIVE VIDEO, 75% COLOUR BARS, 100% COLOUR BARS, MULTIBURST, CCIR 17/330, NATIONAL ITS, or CCIR18. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTO MEAS SET display screen.

SYS VIDEO LIMITS

Lets you select and set digital system limits. See Figure 6-2 for a list of digital system limit options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

H BLANKING LEVEL

Lets you set a horizontal blanking level between 5 and 90 IRE.

COLOR SETUP

Lets you select the MEASURE LINE, SIGNAL ID, or COLOR LIMITS options (COLOUR LIMITS for PAL).

MEASUREMENT LINE

Lets you select a line (1/3:10 to 2/4:262) that measurements can be taken from (1/3:7 to 2/4:612 for PAL).

SIGNAL ID (NTSC)

Lets you select LIVE VIDEO, 75% COLOR BARS, 100% COLOR BARS, 75% SMPTE BARS, FCC MULTIBURST, FCC COMPOSITE, NTC7 COMPOSITE, MULTIBURST or AUTO SIG ID. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTOMEASURE display screen.

SIGNAL ID (PAL)

Lets you select AUTO SIG ID, LIVE VIDEO, 75% COLOUR BARS, 100% COLOUR BARS, MULTIBURST, CCIR 17/330, NATIONAL ITS, or CCIR18. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTO MEAS SET display screen.

COLOR/COLOUR LIMITS

Lets you select and set color/colour limits. See Figure 6-2 and Figure 6-3 for a list of color limit options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

FREQUENCY RESP

Lets you select the MEASURE LINE, SIGNAL ID, FREQ RESP LIMITS, MULTIBURST TIMINGS, or PACKET FEQUENCIES options.

MEASUREMENT LINE

Lets you select a line (1/3:10 to 2/4:262) that measurements can be taken from (1/3:7 to 2/4:612 for PAL).

SIGNAL ID (NTSC)

Lets you select LIVE VIDEO, 75% COLOR BARS, 100% COLOR BARS, 75% SMPTE BARS, FCC MULTIBURST, FCC COMPOSITE, NTC7 COMPOSITE, MULTIBURST or AUTO SIG ID. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTOMEASURE display screen.

SIGNAL ID (PAL)

Lets you select AUTO SIG ID, LIVE VIDEO, 75% COLOUR BARS, 100% COLOUR BARS, MULTIBURST, CCIR 17/330, NATIONAL ITS, or CCIR18. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTO MEAS SET display screen.

FREQ RESP LIMITS

Lets you select and set frequency response limits. See Figure 6-2 and Figure 6-3 for a list of frequency response limit options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

MULTIBURST TIMINGS

Lets you select and set times for BAR, PEDESTAL, and Packet 1 to 6 for a custom multiburst setting. See Figure 6-2 and Figure 6-3 for a list of multiburst timing options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

PACKET FREQUENCIES

Lets you select and set frequencies for Packet 1 to 6 for a custom multiburst setting. See Figure 6-2 and Figure 6-3 for a list of multiburst timing options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

NON LINEAR

Lets you select the MEASURE LINE, SIGNAL ID, or NON LINEAR LIMITS options.

MEASUREMENT LINE

Lets you select a line (1/3:10 to 2/4:262) that measurements can be taken from (1/3:7 to 2/4:612 for PAL).

SIGNAL ID (NTSC)

Lets you select LIVE VIDEO, 75% COLOR BARS, 100% COLOR BARS, 75% SMPTE BARS, FCC MULTIBURST, FCC COMPOSITE, NTC7 COMPOSITE, MULTIBURST or AUTO SIG ID. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTOMEASURE display screen.

SIGNAL ID (PAL)

Lets you select AUTO SIG ID, LIVE VIDEO, 75% COLOUR BARS, 100% COLOUR BARS, MULTIBURST, CCIR 17/330, NATIONAL ITS, or CCIR18. When AUTO SIG ID is selected, the AVM-510A automatically detects from the selected line what type of test signal is present. The line number and type of test signal present appears in the upper-right corner of the AUTO MEAS SET display screen.

NON LINEAR LIMITS

Lets you select and set non linear limits. See Figure 6-2 and Figure 6-3 for a list of non linear limit options. Refer to “Parameters: Range, Accuracy, and Limits,” in Chapter 10, for their associated nominal values.

AUTOMEASURE (NTSC)

Lets you select a line (1/3:10 to 2/4:262) that measurements can be taken from.

Refer to Appendix F, "Options (AVM-510A)," for more information about optional measurement sets.

AUTO MEAS SET (PAL)

Lets you select a line (1/3:7 to 2/4:612) that measurements can be taken from.

RESPONSE TIME (AVM-510A)

Lets you select the response time via a bar graph.

NOISE LINE (AVM-510A)

Lets you select a noise line between 10 and 35.

REPORT Sub-Menu (AVM-510A)

The *REPORT* sub-menu options let you select the START/STOP TIME SETUP, SCHEDULED REPORT INTERVAL, ERROR REPORTING, REPORT SUSTAINED ERRORS, REPORT ALL ERRORS CLEAR, or REPORTING DELAY options.

START/STOP TIME SETUP

Lets you select the START/STOP, START REPORT TIME, STOP REPORT TIME, or SCHEDULED REPORT INTERVAL options.

START/STOP FUNCTION

Lets you turn ON/OFF the START/STOP option.

START REPORT TIME

Lets you select and set HOURS and MINUTES for the START REPORT TIME option.

STOP REPORT TIME

Lets you select and set HOURS and MINUTES for the STOP REPORT TIME option.

SCHEDULED REPORT INTERVAL

Lets you turn OFF or set the SCHEDULED REPORT INTERVAL time in minutes.

ERROR REPORTING

Lets you turn ON/OFF ERROR REPORTING.

REPORT SUSTAINED ERRORS

Lets you turn OFF or set the time (in minutes) of REPORT SUSTAINED ERRORS.

REPORT ALL ERRORS CLEAR

Lets you turn ON/OFF the REPORT ALL ERRORS CLEAR option.

REPORTING DELAY

Lets you turn ON/OFF the REPORTING DELAY option.

AUDIO OPTIONS Sub-Menu (AVM-510A)

The *AUDIO OPTIONS* sub-menu options let you select the AUDIO METER, REF LEVEL dB, or AUDIO REPORT options.

AUDIO METER

Lets you turn ON/OFF audio meter displays for the analog audio inputs.

REF LEVEL dB

Lets you set audio reference levels between –20 to 10 dB. See Figure 8-1 for more information.

AUDIO REPORT

Lets you select REPORTING, HIGH AUDIO LIMIT, or LOW AUDIO LIMIT.

REPORTING

Lets you turn ON/OFF audio REPORTING.

HIGH AUDIO LIMIT

Lets you set HIGH REPORT LIMIT (in dB) and HIGH ALARM DELAY (in seconds).

LOW AUDIO LIMIT

Lets you set LOW REPORT LIMIT (in dB) and LOW ALARM DELAY (in seconds).

MULTIBURST ID (AVM-510A)

Lets you select between STANDARD, CUSTOM, or AUTO DETECT multiburst IDs. If AUTO DETECT is selected, Multiburst IDs are automatically detected.

Using Intensity and Persistence

Intensity and persistence are set with two controls in the *DISPLAY* menu. To change either one:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *INTENSITY* and then turn the knob to change it. The bar changes in length and you will see an immediate change in the waveform or vector display.
4. Select *PERSISTENCE* and then turn the knob to change it. You might not see an immediate effect until the waveform or vector itself changes, or until you move them with positioning controls.

Intensity has no effect on the display of the picture or the automeasurement screen. There are also different settings of Intensity and Persistence for 1H and 2H sweeps, magnified or normal, line select, vector, vector magnified, or vector with line select as listed in the following table.

Settings	Plain	H Mag	V Mag	Line Select	H Mag with Line Select
1H or 2H sweep	X	X		X	X
2F sweep	X	X		X	X
Vector	X		X	X	X
Vector with waveform	X	X		X	X

If you turn up the Intensity when viewing a single line that is magnified, you do not change it for a regualr two-line display or for vectors. Each time you change the Intensity or Persistence settings, they will be that way when you next have that same kind of display.

Changing the color of the waveform or the vector affects the intensity of the display, but not the setting of the Intensity control. Turning the three colors for a waveform down lessens the intensity, but it is best to use the three-color controls only to get the hue and then use Intensity to change the density of the trace.

The Intensity and Persistence settings are stored in the memories, but only for the display type used at the time the memory is stored. For example, if you store a line-select vector, the settings for the line-select waveform are not stored in that memory.

The Persistence control can be set to infinity by extending the bar all the way to the right. With this setting, the trace never decays. For example, look at a test signal from a generator. Choose a 1H sweep rate, H Mag, and Line Select. Enter the *DISPLAY* menu so you can change the Persistence. Turn it way down, to the left, and you will see very few dots making up the trace. The MM-410/AVM-510A is sampling the incoming signal at various randomized points and building a trace. With Persistence turned down, those individual points decay rapidly.

Turn the Persistence all the way up to the right. Now, without touching the front panel controls, change the test signal at the generator. You will see both the old and new signal, because the Persistence is infinite, the old trace did not decay. As soon as you move the waveform or change any control, the old trace disappears and a new trace starts to build.

Identifying Waveforms

If you need to measure signals in different standards (composite, SMPTE, GBR, and Beta), you can select a different waveform and vector color for each standard, and then store them in separate memories. Afterwards, when you recall a memory, the MM-410/AVM-510A switches to the proper video standard and displays the waveform in a distinctive color. To establish colors associated with standards:

1. Press the **Config** button.
2. Select *INPUT* and then press the **Enter** button.
3. Select an input standard for both inputs (both will be saved in memory).
4. Press the **Prev Mnu** button.
5. Select *DISPLAY* and then press the **Enter** button.
6. Select *COLOR* and then press the **Enter** button.
7. Select the *WAVEFORM*, *VECTOR*, or *GRATICLE* color and then press the **Enter** button.
8. Select one of the colors and then turn the knob to adjust it. Press the **Prev Mnu** button to go back and change the color for another part of the display. You will see the color change, if you are viewing a waveform or vector as you make the changes.
9. Press the **Prev Mnu** button until you get back to the *Config* menu.
10. Select *MEMORIES* and then press the **Enter** button.
11. Select *STORE MEMORY* and then turn the knob to select a memory number (1 to 10).
12. Select *STORE* and then press the **Enter** button to store the current configuration.
13. Press the **Clr Mnu** to exit.

    NOTE: The configuration you store replaces anything previously stored in that memory number.

Another way to identify the signal source is to label the inputs. The labeling system has upper and lower case letters, numbers, and punctuation including µ and ° as listed in the following table. Labels are stored in the memories, one for A and one for B, so you can have up to six pairs of labels stored.

Characters Available for Labeling the Inputs
(Listed in selection order as you turn the knob clockwise)

° % & ‘ ( ) * + , - . / [numerals 0 – 9] : ; < = > ? ± · [capital letters A – Z] ^ _ [lower case letters a – z]
[normal space] µ [small space]

To create labels, decide what you want the label to say. You get 12 characters for each label.

1. Press the **Config** button.
2. Select *INPUT* and then press the **Enter** button.
3. Select *LABEL INPUTS* and then press the **Enter** button.
4. Use the **Arrow** buttons to select *A:* and then press the **Enter** button.
5. Turn the knob to select the first character of your label. After it appears in the cursor, press the **Enter** button.
6. When one label is complete, press the **Prev Mnu** button and then press an **Arrow** button to move to the other input.
7. Press the **Enter** button to start a new label.
8. To erase a label and revert to the default label, make sure the first character is a space. You do not need to erase every character. The other characters will remain in the label in the menu, but the label in the display will be the default one.
9. Store this pair of labels in a memory, along with the colors, positions, sweep rate, and video standard for both inputs.
10. Press the **Clr Mnu** button to exit.

Displaying SC/H Phase and Time Codes

The label under the waveform always shows the sweep rate. You can add three other items to the label: a measurement of the SC/H phase of composite or S-video signals, a color frame indicator, and a time display (VITC or Internal Clock).

The SC/H and Color Frame readouts give you information about the signal you cannot get from looking at the waveform. These readouts do not appear with vectors or with the combination vector-waveform display. They also do not appear if you display both A and B inputs together. In addition, the SC/H and Color Frame readouts cannot appear if the designated input standard is component; however, the clock display can appear.

The SC/H phase readout, when enabled, appears under the waveform when viewing composite or S-video waveforms. The reading is in degrees, plus or minus.

The Color Frame indicator tells you whether the viewed input and the external reference signal are in the same color frame. When turned on, three possible states exist:

Readout	Meaning
C/F OK	The selected input and external input are in the same color frame.
C/F ERR	They are not in the same color frame.
NO REF	There is no signal at the *REFERENCE* input.

To view the SC/H Phase and Color Frame:

1. Press the **Mesmnt** button.
2. Select *WAVEFORM READOUTS* and then press the **Enter** button.
3. Select *SC/H PHASE* and then press the **Enter** button to turn it on or off.
4. Select *COLOR FRAME* and then press the **Enter** button to turn it on or off.
5. Press the **Clr Mnu** button to exit.

The time display in the lower-right corner shows either VITC time code, taken straight from the signal, or the internal clock. To view this display, you have to turn it on, and then select which one you want to display (*VITC TIMECODE*, *INTERNAL CLOCK*, or *AUTO SWITCH*). If you want to view VITC, the MM-410/AVM-510A has to know which line has the time code. If you use the internal clock, you have to set the time and date. Note that the date part of the clock is used in reporting; however, it is not displayed on the screen.

To turn these features on and off:

1. Press the **Mesmnt** button.
2. Select *TIME READOUT* and then press the **Enter** button.
3. Select *TIME* and then press the **Enter** button to turn it on or off. This controls the display of both types of time readout.
4. If you are going to use VITC, use the **Arrow** buttons to select *VITC LINE* and then turn the knob until the number of the correct VITC line appears.
5. Select *TIME SOURCE* and then press the **Enter** button to select one of the following:
   - *VITC TIMECODE* — the readout will always be VITC time code.
   - *INTERNAL CLOCK* — the readout will always be the internal clock.
   - *AUTO SWITCH* — the readout will be VITC if the time code is present on the designated line. Otherwise, it will be the internal clock.

To set the internal clock:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Enter** button.
3. Select *SET INTERNAL CLOCK* and then press the **Enter** button.
4. Select each of the parts of the date and time and then rotate the knob to select the current time.
5. Set the time several seconds ahead of the current time and then select *Press To Set*. When that time appears, press the **Enter** button. The internal clock will be set to that time and date, and you will see the time display updated.

Videotaping Waveforms

Because the output of the MM-410/AVM-510A is a video signal, you can handle it as you would handle any other video signal. There are two video outputs, both available at the same time: one VHS and one S-video. Note that the output is always NTSC when the input is a 525-line system, and it is always PAL when the input is 625. It is not possible to look at a problem in 625 EBU and record the output on an NTSC VCR.

Memory Recall with External Switches

In some environments it is helpful to have a quick way to recall MM-410/AVM-510A memories. For example, in a manufacturing environment, where the MM-410/AVM-510A might not be in a location convenient for a technician, it is helpful to be able to recall specific memory locations with the push of a button.

The MM-410/AVM-510A's DC CONTROL/ALARM rear panel connector provides this capability. A momentary ground (earth) connection can recall any one of the first four memories as listed in the following table. If you build a switch box to take advantage of this feature, make sure you use momentary switches because if one of the recall pins is held to ground (earth), the MM-410/AVM-510A's front panel will be locked.

Pin	Description
1	Recall memory 1
2	Recall memory 2
3	Recall memory 3
4	Recall memory 4

External Alarm and Memory Status

An Alarm Out connection is available at the rear panel of the AVM-510A. This connection, pin 5 of the DC CONTROL/ALARM connector, goes to ground (earth) potential (from +5 V dc pull-up) each time an automeasurement screen is displayed that has an out-of-tolerance condition and the *MASTER ALARM* has been turned on.

NOTE: The MM-410 does not support the Alarm Out function (pin 5) of the DC/CONTROL/ ALARM connector.

To turn the *MASTER ALARM* on or off:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Enter** button.
3. Select *ALARM SETTINGS* and then press the **Enter** button.
4. Select *MASTER ALARM* and then press the **Enter** button to turn it on or off. Note that the status of this option is one of many items stored in memory.

   NOTE: The *MASTER ALARM* also goes to ground if Picture Guard is active and one of the enabled measurements goes out of tolerance.

20 Second Delay

When any control setting on the front panel is changed, the *MASTER ALARM* is disabled for 20 seconds. This prevents the AVM-510A from sending an alarm while it changes from one mode to another. After the 20 second delay, any change in the signal that causes an out of tolerance condition triggers the *MASTER ALARM* immediately.

Memory Status

The recall of the first three memories is indicated by three separate ground closures in the DC CONTROL/ALARM connector as listed in the following table. For example, when memory 1 is recalled, either from the front panel or remotely by grounding pin 1 of the connector, pin 6 changes from +5 V dc to 0 V dc.

NOTE: The MM-410 does not support the Alarm Out function (pin 5) of the DC/CONTROL/ ALARM connector.

Pin	Description
5	Alarm out
6	Memory 1 out
7	Memory 2 out
8	Memory 3 out
9	Ground (earth)

NOTE: This is not a momentary change of state. The output pin goes to ground (earth) and stays there until another memory is recalled, regardless of other changes that might be made from the front panel. Even storing a new configuration in a memory does not change the grounded state of this pin.

Controlling the AVM-510A with a Computer

From a remote location, you can control the AVM-510A with a computer. For shorts distances, you can connect directly through the computer's serial port. For greater distances, connect over telephone lines with a modem. Suggestions for applications and general setup are provided in this section. Complete instructions for this type of AVM-510A control can be found in the Logbook Software manual.

To connect at long distances, you need:

- A computer running Windows 3.1, 95, 98, or NT and a modem
- A modem for each AVM-510A
- A telephone number for the AVM-510A modems
- Logbook Software

To connect at short distances, you need:

- A computer running Windows 3.1, 95, 98, or NT with an available serial port
- A 9-pin serial cable
- Logbook Software

To configure the AVM-510A for a modem connection:

1. Connect the AVM-510A using the RS-232/Modem port at the rear panel to an available modem connection (see Figure 3-2).
2. Press the **Config** button.
3. Select *OTHER* and then press the **Enter** button.
4. Select *SERIAL PORTS* and then press the **Enter** button.
5. To set the desired configuration, select *MODEM PRINTER PORT*.
6. Press the **Clr Mnu** button to exit.

To configure the AVM-510A for a direct computer connection:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Enter** button.
3. Select *SERIAL PORTS* and then press the **Enter** button.
4. Select *COMPUTER SETUP* and then press the **Enter** button.
5. Select *BAUD RATE* and then select *9600*.
6. Select *HANDSHAKING* and then select *XON/XOFF*.
7. Press the **Clr Mnu** button to exit.

Getting Information To and From the AVM-510A

Besides displaying the waveform of the signal on a picture monitor, the AVM-510A has several other features in getting information to and from a computer and printer. These include printing a waveform to a printer, alerting you, with a relay closure, that some measurement value has exceeded its tolerance, letting you know which memory was selected or selecting a memory with a relay closure, and the ability to control the AVM-510A with a computer from a remote site.

The method that offers the most flexibility is to connect the AVM-510A to a computer running Logbook Software. This lets you operate the AVM-510A from a computer as you would from the front panel.

The second method is reporting. A report is a list of measurements sent directly to a computer, running any communications program, or sent to a serial printer. Reports can be generated at set intervals, when there is an error, when errors are cleared, or any combination of these.

Each of these features are explained in the sections that follow.

Printing Waveforms and Vectors (AVM-510A)

You can print anything you see in an AVM-510A display except the picture. The picture display is not processed in the AVM-510A, so it is not available in digital form.

Before you print, you must connect a printer and then configure the AVM-510A for the printer you want to use. Note that the output to the printer is black and white, even if the waveform is in color.

Connect the printer, using a serial cable, to the AVM-510A's RS-232 Modem connector at the rear panel. To configure the AVM-510A for a printer:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Enter** button.
3. Select *SERIAL PORTS* and then press the **Enter** button.
4. Select *MODEM/PRINTER PORT* using the **Enter** button.
5. Select PRINTER SETUP using the **Arrow** buttons and then press the **Enter** button.
6. Select *PRINTER TYPE* and then press the **Enter** button to select the printer type you have connected.
7. Select *BAUD RATE* and then press the **Enter** button to select the printer's baud rate.
8. Select *HANDSHAKING* and then press the **Enter** button to select *XON/XOFF*.
9. To print a waveform, press the **Prev Mnu** button, select *MODEM/PRINTER PORT* and then select *PRINT SCRN*. Afterwards, press the **Blue** (2nd) and **Split Screen** buttons at the same time.

Intensity, Persistence, and Print Density Controls

The Intensity, Persistence, and Print Density controls all affect a printed image. You can use these controls to emphasize the part of the waveform or vector you want to record.

To see how these controls affect a printed image, think of the video from the AVM-510A consisting of a fine grid placed over a regular CRT waveform monitor and the brightness of the phosphor is read at each grid point.

When a point is read, the setting of the Persistence control determines how much the intensity at that point has decayed since the last time this point was read. The brightness of the display at any point is a function of how many times the video signal has hit that grid point, plus the previous brightness at that point, minus the decay set by the Persistance control.

Look at a vector as an example. A normal color bar vector consists of six points plus the center where the trace spends most of the time and connecting transition lines where the trace spends a much shorter time. At the normal factory setting of Intensity and Persistence, the dots and the transitions appear nearly the same so you can see any irregularities in the transitions.

If you turn the Intensity and Persistence to their lowest levels, you will see much fainter transition lines, but the dots appear clearly.

Print the vector using several settings of Print Density. At low settings, you will get nothing but the vector graticle. At higher settings the dots appear, and at very high settings the transitions are visible in the print.

Print a waveform of live video. With a low setting for Print Density, none of the chroma or noise is printed. Higher settings print all the noise and chorma. There are times when the printed image needs to show all the noise and chorma, which requires high levels of Intensity, Persistence, and Print Density. There are other times when only the average video level is important, and lower settings are used.

7. Viewing Waveforms, Vectors, and Pictures

Introduction

This chapter shows you how to view waveforms, vectors, and pictures using the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A). Sections in this chapter include:

- Waveforms:
  - Displaying a waveform
  - Setting a sweep rate
  - Measuring a waveform with the graticule
  - Setting waveform limit lines
  - Switching PAL graticule to percent
  - How to view a selected line
  - Viewing a vertical interval
  - Using filters
- Vectors:
  - Viewing a vector
  - Controlling the vector display
  - Locking the vector to external sync
  - Comparing two waveforms or vectors
  - Setting waveform and vector images
  - Locking and clamping the signal
- Pictures:
  - Viewing a picture with waveforms
  - Monitoring signal quality with Picture Guard
  - Picture reference when the External Reference (Ext Ref) LED is on

Displaying a Waveform

Pressing the **Waveform** button lets you see a waveform for the selected input signal. Once displayed, you can move and expand it vertically and horizontally using the Vertical/Horizontal (knobs) and **V Mag**/**H Mag** buttons.

Figure 7-1 shows a basic waveform display.

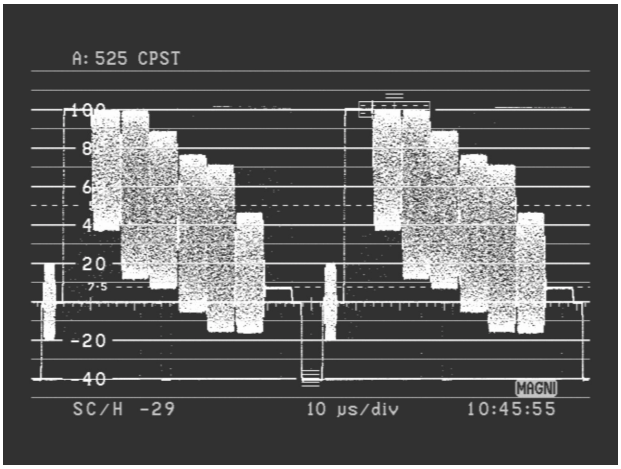


Figure 7-1. Basic Waveform Display

NOTE: Pressing the **Waveform** button twice always results in a two-line display with no line select and no magnification.

Setting a Sweep Rate

The sweep rate is set using the **Sweep** and **H Mag** buttons. Pressing the **Sweep** button changes the sweep rate and the display of the viewed input signal (see Figure 7-2). Three unmagnified sweep rates are available:

- 1H shows one line of the input signal, with the next line off the screen at the right
- 2H shows two lines of the input signal with sync at the center
- 2 Field shows two complete fields of the input signal

NOTE: The **Sweep** button toggles between 1H and 2H. The 2 Field sweep rate is accessed by pressing the **Blue** (2nd) button and then the **Sweep** button.

Under certain situations a 2 Field sweep rate is not available. For example, if you are unable to view filters in Parade at the 2 Field sweep rate but you can see either the Luma or Chroma filter as two fields. Also, you cannot display a vector with a waveform at the 2 Field sweep rate.

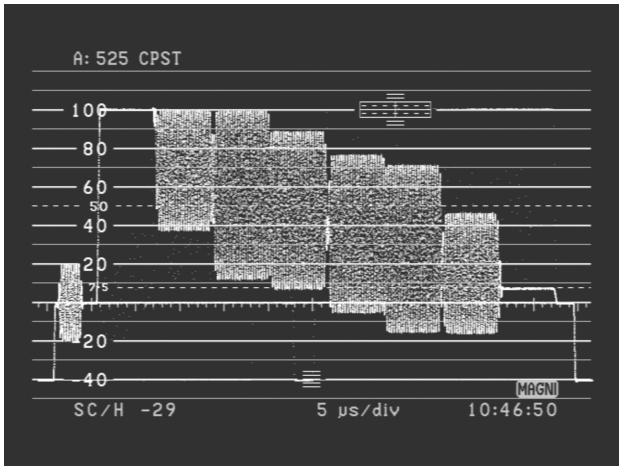


Figure 7-2. 1H Sweep Rate (A: 525 CPST)

The following table lists the sweep selections and sweep rates for the MM-410/AVM-510A.

Sweep Selection	Sweep Rate
1H	5 µ/division (shows one line)
1H Magnified	0.1 µ/division
2H	10/division (shows two lines)
2H Magnified	1 µ/division
2 Field	Shows two fields
2 Field Magnified	Shows two fields expanded
Parade	15 µ/division
Parade Magnified	1 µ/division

Measuring a Waveform with the Graticule

The MM-410/AVM-510A lets you use special graticules for measuring waveforms. For example, you can turn on amplitude limit lines so that all signal features above and below certain limits show up in red. You can also turn on limit boxes to show where sync and blanking widths should be. If you are using PAL, you can use a waveform graticule in volts or percent.

Using waveform limit lines and horizontal blanking boxes (called Added Marks), you can quickly determine when signals are out of tolerance.

Waveform Limit Lines

Waveform limit lines cause the waveform to turn red each time a portion of it goes outside a pre-determined set of limits. Two specific limits can be set: an upper limit for peak video and a lower limit for sync tip.

When an upper limit is set, the waveform turns red every place the signal exceeds the upper limit, including the vertical limit. For example, if you have a vertical interval test signal, such as modulated ramp, where the chroma or any part of the signal exceeds the upper limit, this area also appears red.

The lower limit includes sync tip, burst, and any part of the input signal that goes below the set limit. If you set the limit above the middle of sync and the bottom of burst, some of the color bars will be red at the bottom of the waveform.

Added Marks

Added marks helps determine various limits in the horizontal interval. Marks include: horizontal sync width, horizontal blanking, and burst amplitude and position. Note that these marks are only visible in 2H Mag and cannot be adjusted.

To see added marks (Figure 7-3):

1. Press the **Sweep** button until the 2H LED lights.
2. Press the **H Mag** button to horizontally magnify the sweep.
3. If you do not see the boxes, press the **Config** button to access the *Configure* menu.
4. Select *DISPLAY* and then press the **Enter** button.
5. Select *GRATICULE OPTIONS* and then press the **Enter** button.
6. Select *ADDED MARKS* and then press the **Enter** button.
7. Select *MARKS* to turn added marks *ON/OFF*.

Once visible, adjust the waveform vertically so the blanking level rests on the zero graticule line. Position it horizontally so the leading edge of the sync passes through the + mark on the screen. The remaining parts of the signal should be visible as shown in Figure 7-3.

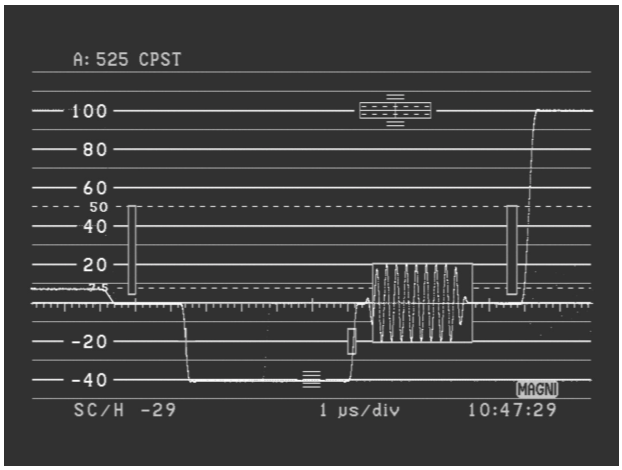


Figure 7-3. Added Marks Box Locations

Setting Waveform Limit Lines

Waveform limit lines show any part of the input signal that goes above or below a pre-determined set of limits. Note that these limits are shown relative to the signal blanking level, not the graticule, so moving the waveform up or down does not move the beginning of the red area (see Figure 7-4).

To set waveform limit line values or to toggle this feature on and off:

1. Press the **Config** button to access the *Configure* menu.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *WFM LIMIT LINE* and then press the **Enter** button.
4. To turn *WFM LIMIT LINE* ON or OFF, select *OUT OF LIMIT LINE* and then press the **Enter** button or turn the knob.
5. To set an upper or lower limit line, select either *UPPER LIMIT LINE* or *LOWER LIMIT LINE* and then press the **Enter** button or turn the knob.

The red limit portion of the display is not affected by the vertical postion of the waveform. However, the limit line border is affected by variable gain. Increasing the variable gain causes either end of the waveform to turn red.

If the limit line feature is on when you switch to vertical magnification, the limit line feature turns off. When you turn off vertical magnification, the limit line comes back on.

Limit lines also work with Luma and Parade filters, but not with the Chroma filter alone. Use caution when working with a Parade filter. In this case, the limit line border is attached to the unfiltered waveform on the left of the display. Moving it separately up and down moves the red border of all three waveforms. In addition, moving the two filtered waveforms separately can move them in or out of the red area.

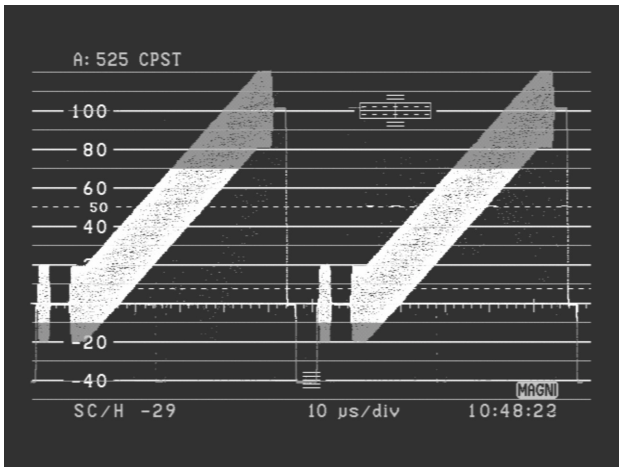


Figure 7-4. Waveform Limit Lines at 70 and –10 IRE

Switching PAL Graticule to Percent

The PAL waveform graticule is scaled, in volts, by default (Figure 7-5). For some measurements you might want to change this option to percent (Figure 7-6). To switch the PAL graticule from volts to percent:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *GRATICULE OPTIONS* and then press the **Enter** button.
4. Select *PAL GRATICULE*.
5. Press the **Enter** button or turn the knob to highlight either *VOLTS* or *PERCENT*.
6. Press the **Clr Mnu** button to exit.

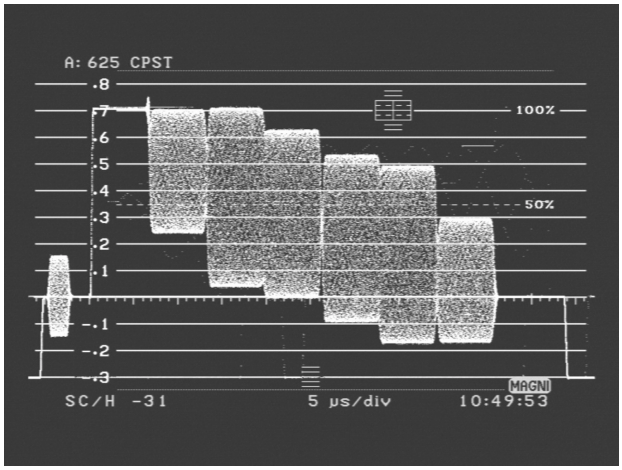


Figure 7-5. PAL Volts Graticule

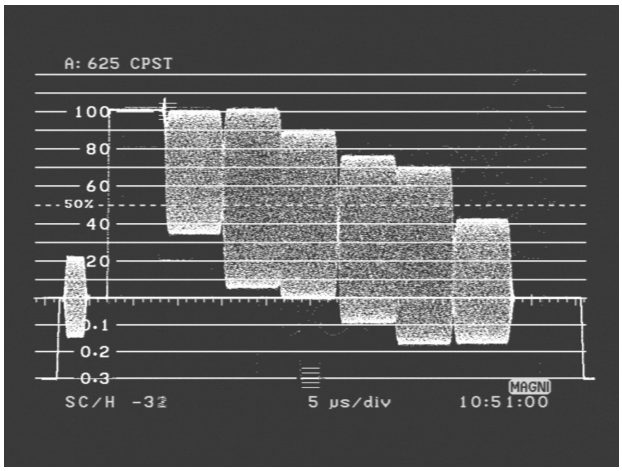


Figure 7-6. PAL Percent Graticule

How to View a Selected Line (Waveform, Vector and CPNT Bars)

You use the front panel to view a selected line from an odd field or an even field. The MM-410/AVM-510A is normally set up to view all lines of the video signal, however, you can change this setting to view any two or 15 lines by pressing the **Line Sel** button and accessing the *Configure* menu.

Whether you view one or two lines depends on the sweep rate. In 1H sweep, the display shows the selected line with the next line off to the right of the screen. If you want to view the next line, turn the knob to the right until it appears on the display. In 2H sweep, the selected line is the one on the left of the pair of lines shown.

Each time Line Select is used, a numeric indicator (indicating field and line numbers) appears over the graticule (see Figure 7-7) and a corresponding LED lights indicating that the knob is controlling the line selection. You can change the line number (the number after the colon in the numeric indicator) by turning the knob. Press the **Line Sel** button to go back to viewing all lines.

Line select also means field select as well. To change the selected line view from an odd field to an even field, press the **Field Sel** button. You can also change to the other field by turning the knob through the vertical interval and into the next field, going in either direction.

> **NOTE:** You cannot view a selected line in all fields at once, nor is it possible to view a line from just one field. Odd fields and even fields are your only choices.

As stated above, the MM-410/AVM-510A is normally set to Line Select so you can view two lines at a time. To change this setting to view 15 lines:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *LINE SELECT MODE*.
4. Press the **Enter** button or turn the knob to change between *2-LINE* or *15-LINE* modes.
5. Press the **Clr Mnu** button to exit.

The settings for intensity and persistence are different for line select and normal all-lines viewing. The default settings for intensity and persistence are both much higher for line select mode. If you change the intensity during line select, this does not affect the intensity when viewing all lines.

The most efficient way to use line select is with the two-field display. When you use 2 Field sweep and line select together, the selected lines are brightened in the two-field display.

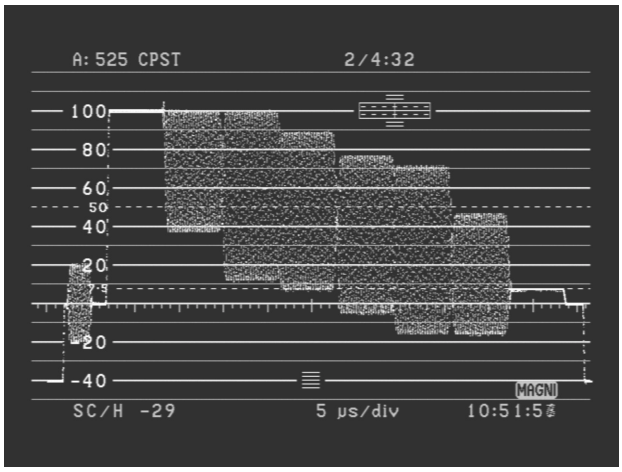


Figure 7-7. Line Select Indicator

Viewing a Vertical Interval

You can view a vertical interval using two methods: 2F sweep (expanded horizontally) and line select (see Figures 7-8 and 7-9). In 2F sweep mode, you can view both fields at once. Expanding this display horizontally (by pressing the **H Mag** button) lets you see the vertical interval. With line select, you can move through the vertical interval viewing each line separately. The indicator at the top of the graticule shows which line you are viewing and from which fields, odd or even.

For best results, you can combine these two methods.

For example:

1. Press the **Blue** button and then the **Sweep** button so the 2F LED lights.
2. Position the waveform so the vertical interval to be viewed is over the five small sync measurement lines near the bottom center of the graticule.
3. Press the **Line Sel** button and then use the knob to brighten a line in this vertical interval.
4. Press the **H Mag** button and position the waveform until you see the desired portion of the vertical interval with two brightened lines. Note that when in H Mag, two lines are brightened.
5. Use the knob to brighten two selected lines. The indicator at the top of the graticule shows the number of the left-hand line and the field number (odd or even).
6. To view the odd or even field, press the **Field Sel** button.

7. Press the **H Mag** button to reduce the two-field magnification.
8. Press the **Sweep** button once or twice to view a one-line or two-line waveform display.
9. To go back to viewing the entire vertical interval, press the **Blue** and **Sweep** buttons and then the **H Mag** button.

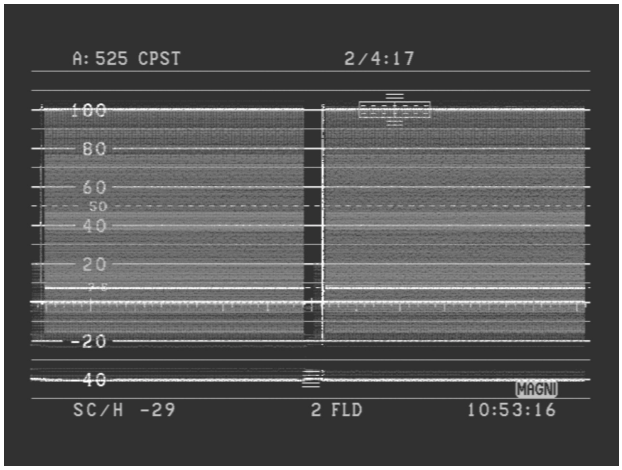


Figure 7-8. 2F Sweep, Highlighting Lines 17 and 18

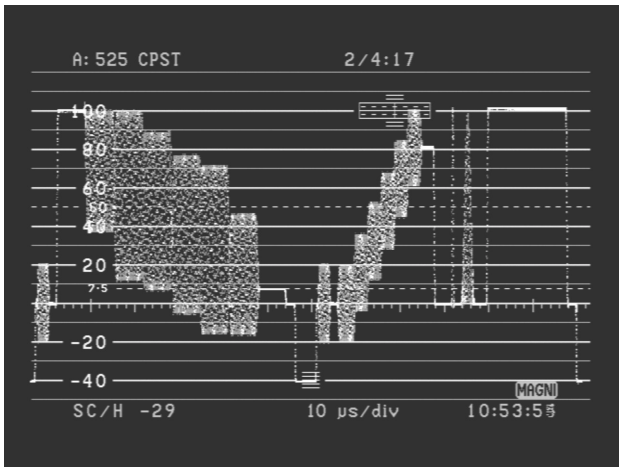


Figure 7-9. 2H Sweep, Line Select on Lines 17 and 18, Even Fields

Using Filters

Filters let you view only a luminance display or a chrominance display. You can parade these waveform displays with the normal or flat waveform to view a signal in three ways at the same time. Paraded filters can also be separated vertically.

NOTE: The luminance display is also available for component signals.

To view the effects of a filter on a composite waveform:

1. Press the **Filter** button. After one push, the Luma LED comes on, and you see only the waveform's luminance frequencies. Everything above the chroma burst frequency is suppressed (see Figure 7-10).
2. Press the **Filter** button a second time. After two pushes, the Chroma LED comes on and everything below the burst frequency is suppressed (see Figure 7-11).
3. Press the **Filter** button a third time. After three pushes, a parade of three views of the same signal appears: flat or no filter, luminance filter, and chrominance filter. In this mode and with the Parade LED on, you can move the three views separately (see Figure 7-12).

Note that the three LEDs next to the **Position** button are lit (**Wfm Pos** button for the AVM-510A). Moving the **V Pos** knob now moves all three parts together.

Successively pressing the **Position** button cycles through individual control of the three parts and then back to vertical control of all three together. Pressing the **Filter** button brings you back to the flat view alone.

In 2F sweep mode, you can use the Luma and Chroma filters, but you cannot parade them. If the B: input has a component signal, you can use the Luma filter on it, and will only apply to all three components. If you view the A: and B: inputs together, the Luma filter is the only one available, and it applies to both signals at the same time.

NOTE: The normal waveform display is actually filtered in the no filter or flat mode to begin rolling off at 8 MHz. If you want to measure a waveform flat to 10 MHz, change to vector with waveform by pressing the **Vector** button twice.

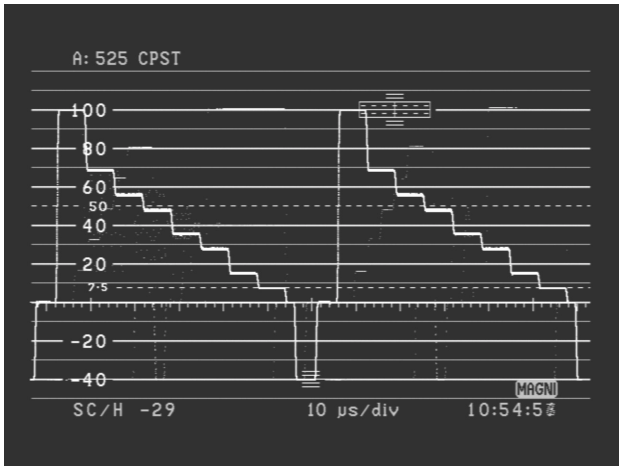


Figure 7-10. Luma Filter on Bars

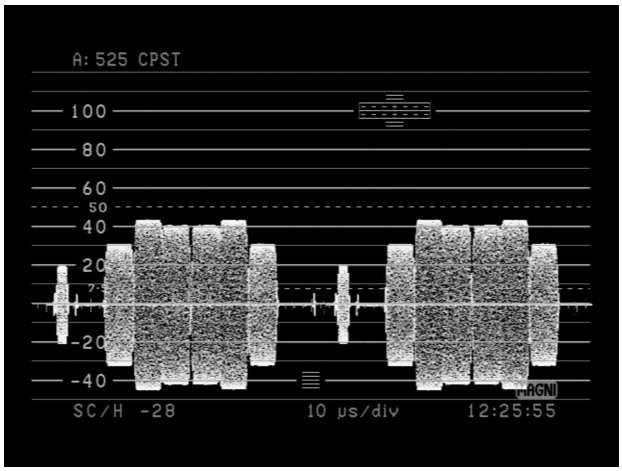


Figure 7-11. Chroma Filter

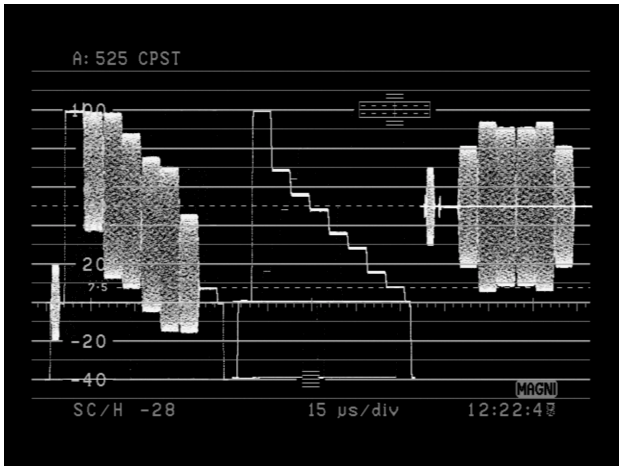


Figure 7-12. Parade of Filters

Displaying a Component Signal

You can display component waveforms in a variety of ways: Y (or G) channel only, all three channels superimposed on each other, or three channels paraded (see Figures 7-13 to 7-15). The component waveform mode will be displayed in the following formats:

- SMPTE/525 or EBU/625
- Beta
- MII
- GBR (or RGB)

  NOTE: GBR and RGB are the same. Magni uses the GBR designation because Green is the channel with sync, if there is sync in the signal.

All component signals must use Input B:. To configure the B input:

1. Press the **Config** button.
2. Select *INPUT* and then press the **Enter** button.
3. Select *INPUT B:*.
4. Turn the knob or press the **Enter** button until the desired component signal is listed.
5. Press the **Clr Mnu** button to exit.

   NOTE: In this manual S-video signals are not considered component signals. S-video signals are treated like composite signals with regard to menu selections.

The graticule changes to accommodate the type of signal you selected. For example, 525 Beta signals use an IRE graticule; however, MII and SMPTE signals use a voltage graticule.

When you select the B: input (by pressing the **Input** button) the **Display** button becomes active. At first the Single LED is on and you see only the Y (or G) channel. Press the **Display** button once to light Alternate and see all three components superimposed. Press the **Display** button a second time to see the three components paraded side-by-side.

In Alternate or Parade mode, you can move the three parts separately. When you first enter either alternate or parade mode, the **V Pos** knob moves all three components together. Pressing the **Position** button cycles through each of the components and then back to all three. Adjusting the vertical position of one of the components in Alternate mode has no effect on its position in Parade mode.

Component signals can be seen in any of the three sweep rates, with the following restrictions:

- In the 2F sweep rate, you can only view at the Y (or G) channel.
- In parade mode, the sweep cannot be changed.

You can also see vectors of component signals but not GBR signals. The vector circle in component is more simplified than the composite version because the phase angle does not have any real meaning.

When you view a vector and waveform together, you see only the Y channel of the waveform because the B-Y and R-Y channels are represented in the vector.

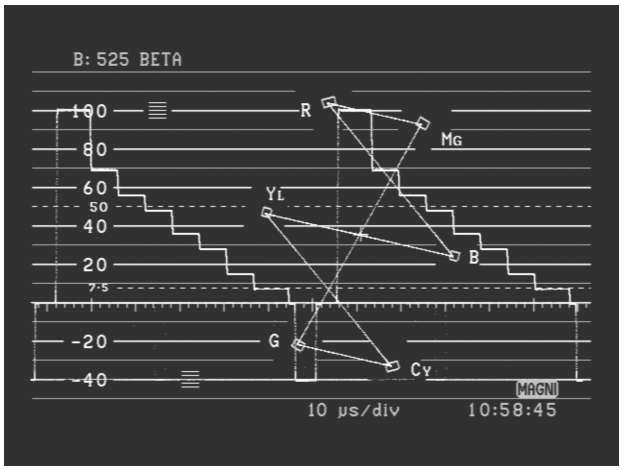


Figure 7-13. Beta Component Waveform and Vector

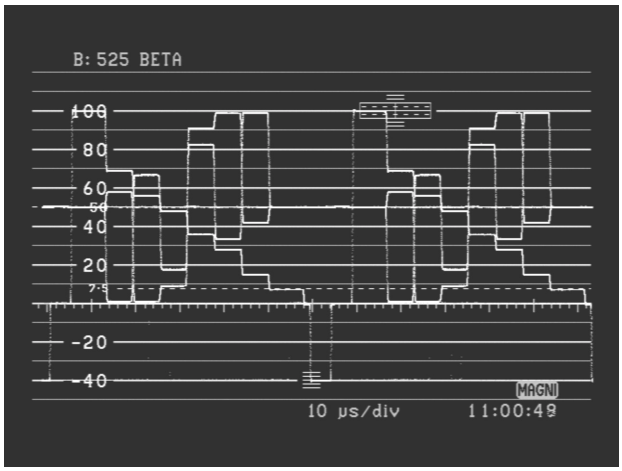


Figure 7-14. Beta Signal in Alternate with B-Y and R-Y Raised

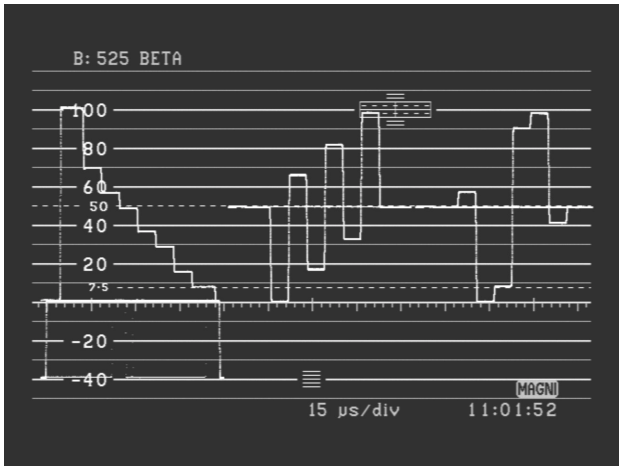


Figure 7-15. 525 Beta Signal, Parade Mode

Displaying a Bowtie Signal

Bowtie is a specific component video signal used to accurately measure the time delay between the components.

Bowtie signals consist of continous sine waves in the three components. In the main channel (Y or G), the sine wave is one frequency. In the other two channels, a slightly higher frequency is used.

The timing of the sine waves are exactly in phase at the center point. Because the Y and B-Y channels have slightly different frequencies, these sine waves are more out of phase as you move away from the center of the signal.

When the B-Y channel is inverted and added to the Y channel, there should be no signal at the center point because they were in phase to start with and are now 180º out of phase. This is the null point. However, as you move away from the center point, the sine waves are still slightly out of phase because they were never in phase to begin with.

Markers in the waveform show exactly where the center point should be and measure off in each direction progressively greater interchannel timing differences. Typically, the markers represent timing differences of 20 ns per mark.

To view a bowtie display:

1. Press the **Config** button.
2. Select *INPUT* and then press the **Enter** button.
3. Select *BOWTIE* and then press the **Enter** button to toggle it *ON* or *OFF*.

On the screen, you see what looks like a two-line display. The left-half of the display compares the Y channel to the B-Y channel; the right-half shows the Y channel to R-Y channel comparision. The large timing mark in the center shows the correct timing; the marks to either side show 20 ns timing increments.

Look at the null point (where the bowtie diminishes to almost no amplitude). If this point is to the left of center, the Y channel is leading the other channel. If the null point does not diminish to zero amplitude, it indicates there is a gain inequality between the two channels.

If you plan to use bowtie measurements to any extent, it is best to set up on the 10 memories for this display mode.

CAUTION: If you see a two-line display that does not look quite right, it might be that the bowtie mode is on, but the incoming component signal is not a bowtie. As a result, an unexpected display might appear on the screen. However, most modes turn off the bowtie mode.

Bowtie also has a use with comosite signals. If you have two composite signals at inputs A: and B:, you can subtract them by turning Bowtie on (indication A-B). In this mode, you can compare the two composite signals that are alike.

You can also use this mode to view the leading edge of sync in 2H Mag. If the leading edges are not exactly in sync, you will see a small bump. A flat line indicates they are in sync.

Viewing a Vector

Vectors can be viewed at any time by pressing the **Vector** button (see Figures 7-16 through 7-18). Pressing the **Vector** button twice shows a vector and a waveform together. Unless you changed it, the vector color is always yellow so it can be seen easily with a waveform. Note that the vector rose (the circular graticule for vectors) is simplified when it is displayed with a waveform.

Component signals can also be displayed as vectors. In this case, only the six color boxes are shown and there is no rose. In addition, phase angle measurements have no meaning in component signals, and the **Vec. Phase** knob does not operate.

Component signals can be displayed as waveforms with composite signals, but their two vectors cannot be displayed simultaneously.

To select a vector color:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *COLOR* and then press the **Enter** button.
4. Select *VECTOR COLOR* and then press the **Enter** button.
5. Select any of the three colors and then turn the knob to increase or decrease the color in the vector trace.
6. Press the **Clr Mnu** button to exit.

Once selected, the color is applied to all vector traces until you recall a memory that uses a different color. To save the color you just selected:

1. Press the **Config** button.
2. Using the arrow buttons, select *MEMORIES* and then press the **Enter** button.
3. Using the arrow buttons, select *STORE MEMORY*.
4. Using the knob, select the desired memory number (1 through 10).
5. Press the **Down** arrow button to select *STORE* and then press the **Enter** button.
6. Press the **Clr Mnu** button to exit.

This process saves the color you just selected as well as these settings: display type, input standard, position, intensity, and whether or not safe area is on or off.

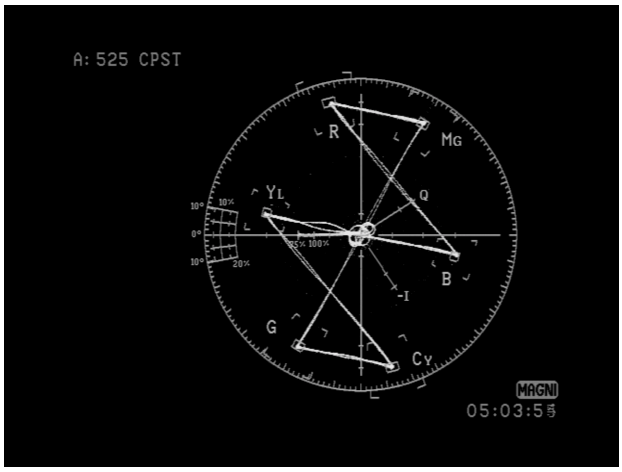


Figure 7-16. Composite Vector

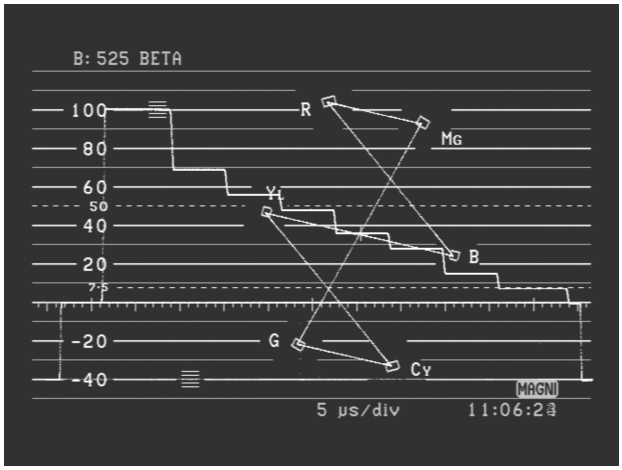


Figure 7-17. Component Waveform and Vector

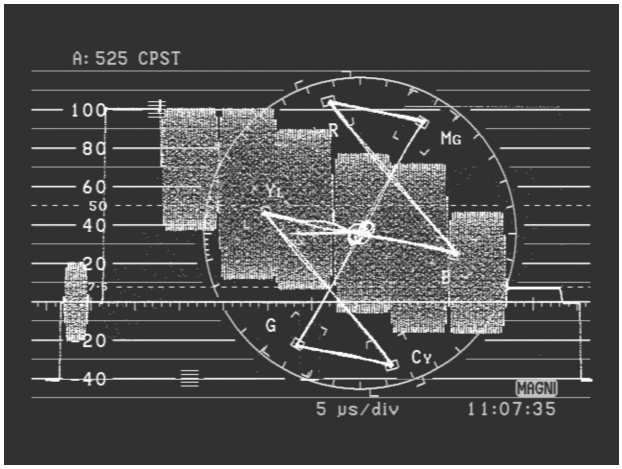


Figure 7-18. Composite Waveform and Vector at 1H Sweep

Controlling the Vector Display

You use the right knob to control the vector display. This switch acts as the variable gain control for vectors as well as waveforms. The switch also has the same scrolling action as the **H Pos** knob for expanding waveforms.

To rotate the vector display, press the **Vec. Phase** button and then turn the knob. The Vec. Phase LED lights indicating that the switch is now controlling the vector phase.

To change the gain of the vector, press the **Var. Gain** button and then turn the knob. The Var. Gain LED lights indicating that the switch is now controlling the vector gain. The word Gain also appears at the upper right of the display.

To select a line, press the **Line Sel** button and then turn the knob. The Line Sel LED lights indicating that the switch is now controlling the line select option. The line select indicator also appears at the top-center of the display. If desired, press the **Field Sel** button to change to the other field.

You can turn off each of the three variable controls individually or you can recall a memory that does not have any variable controls turned on.

For color bar signals with 100% saturation, switch the vector to 100% as follows:

1. Press the **Config** button.
2. Select *VECTOR* and then press the **Enter** button.
3. Select *COLOR BARS* and then press the **Enter** button or turn the knob to choose 75% or 100%.

The **V Mag** button magnifies the vector by a factor of 2.5.

PAL composite vectors have a mirror image appearance that sometimes causes difficulty when attempting to interpret the vector (see Figures 7-19 and 7-20). To switch this effect off:

1. Press the **Config** button.
2. Select *VECTOR* and then press the **Enter** button.
3. Select *+V SWITCH* and then press the **Enter** button or turn the knob to choose *ON* or *OFF*.

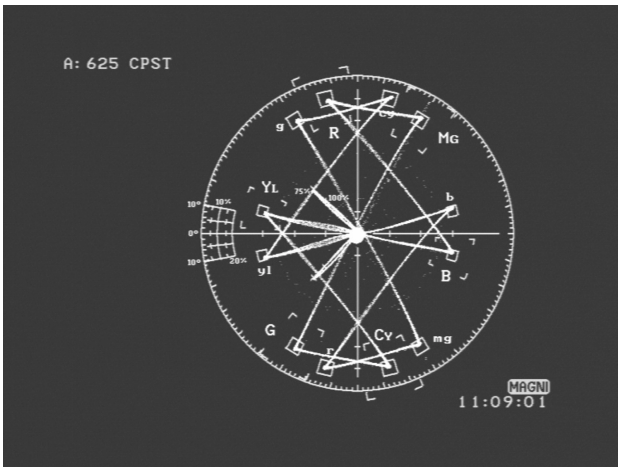


Figure 7-19. PAL Vector Display

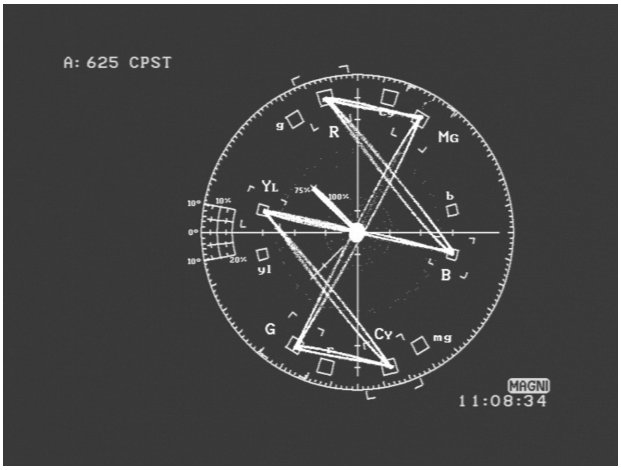


Figure 7-20. PAL Vector with +V Switch

Locking the Vector to External Sync

Vector displays can be locked to an internal or external reference. To lock a vector display to the external sync source, press the **Blue** button and then press the **Field Sel** (**Ext Ref**) button. Repeat this sequence to go back to the internal reference. When the MM-410/AVM-510A is externally referenced, the word EXT appears at the top center of the display.

You can also change to the external reference using the menu path of: *Config*, *REFERENCE* and then selecting *INT/EXT* or using the path of: *Config, PICT. REF*, and then selecting *INT/REF*.

When the vector display is externally referenced, note that the burst vector does not lie along the 180º line. You can rotate this display using the right knob or you can preset the rest position of the external sync as follows:

1. Press the **Config** button.
2. If *REFERENCE* is not *EXT*, press the **Enter** button to select it.
3. Select *VECTOR* and then press the **Enter** button.
4. Select *EXT PHASE PRESET* and then turn the knob to preset the vector's position using the horizontal bar graphs.

When setting external phase preset, the knob will not scroll or spin the vector as it can do with the Vec. Phase control. The external phase preset applies to both A: and B: inputs; there is not a separate preset for each input.

NOTE: The *REFERENCE* must set to *EXT* to adjust *EXT PHASE PRESET*.

Comparing Two Waveforms or Vectors (AVM-510A)

The AVM-510A has several ways to view and compare the signals at the A: and B: inputs. You can see the waveforms of two composite signals together, either side-by-side or superimposed. You can compare the waveforms of one composite and the Y (or G) channel of a component signal. You can also display two composite vectors together (see Figures 7-21 to 7-23).

To view two waveforms at the same time, press the **Input** button once or twice until both the A and B LEDs light. The label at the top left of the screen shows A and B.

Next to the Display button, the Alternate or Parade LED will be lit as follows:

- Alternate — The two waveforms are on top of each other. The sweep rate can be 1H, 2H, or 2F. The **Wfm Pos** button lets you choose which waveform to move vertically with the **V Pos** knob. 1 = A, 2 = B.
- Parade — The two waveforms are side-by-side, with the A waveform on the left. The **Sweep** button does not let you change anything. The **Wfm Pos** button still lets you move the waveforms separately. Note that if you try to push the **Display** button to switch from Alternate to Parade and nothing happens, the problem is that the sweep rate is on 2F. Push the **Sweep** button and then push the **Display** button.

You can compare a composite waveform from Input A: with the first channel (Y or G) of a component waveform in this same way. If the graticules for these two systems are different, the graticule for the composite waveform is used.

- You cannot view two vectors and two waveforms at the same time. Pressing the **Vector** button a second time displays the waveform and vector from the Input A:.
- Line Select not available with two vectors (or with two waveforms).
- Vector Phase operates on both vectors together.
- Var. Gain works on both vectors (or both waveforms) together.
- It is not possible to display a composite and a component vector together.

The way to compare two component waveforms or vectors is to view one of them and then save it as an image, view the other waveform or vector, and then recall the image of the first.

Refer to the next section "Saving Waveform and Vector Images" for more information about saving waveform and vector images.

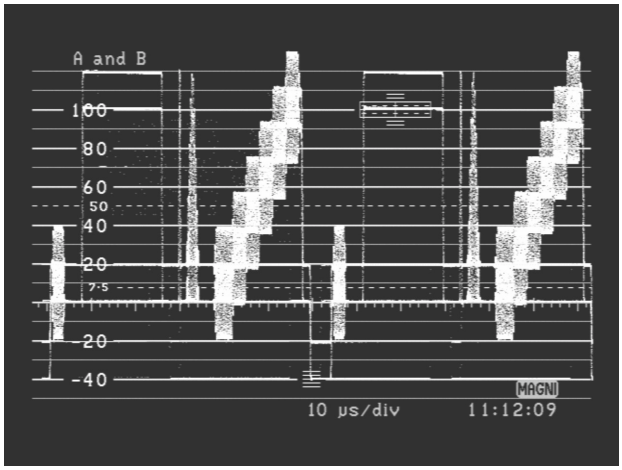


Figure 7-21. Two Composite Waveforms (Alternate)

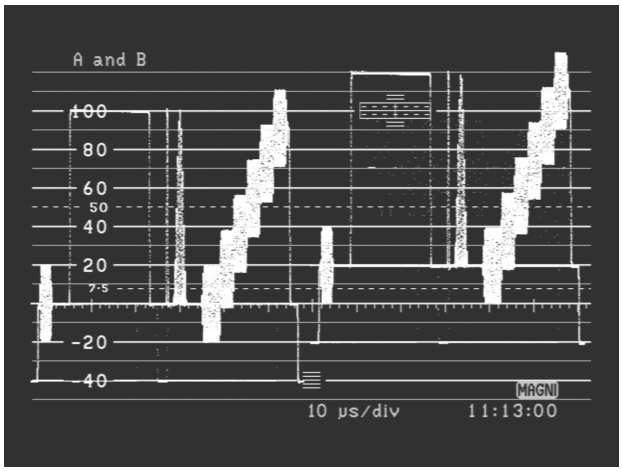


Figure 7-22. Two Composite Waveforms (Parade)

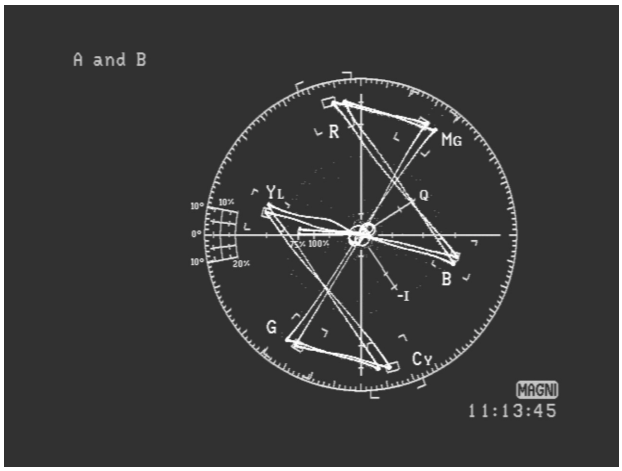


Figure 7-23. Two Composite Vectors

Saving Waveform and Vector Images

The MM-410/AVM-510A has space to save up to 6 waveform or vector images. Before saving an image, keep the following in mind:

- You can save the image of a waveform or a vector or a waveform and vector together.
- The graticule is not saved with the image.
- You cannot move the position of the recalled image.
- Pictures cannot be saved.
- You can save the split screen reduced size image, but only the small waveform and vector will be stored, not the picture.

To save an image:

1. Press the **Config** button.
2. Using the **Arrow** buttons, select *MEMORIES* and then press the **Enter** button.
3. Select *IMAGE NUMBER* and then turn the knob to slect an image storage number from 1 to 6. This number is used for *STORE, RECALL*, and *DELETE*.
4. To store an image, select *STORE* and then press the **Enter** button. As the image is being stored, you will see a digitizing sign with a progress bar. Afterwards, you will see *IMAGE STORED* displayed.

   NOTE: You will not be warned if you store an image where another one is already stored. The new image replaces the old image.

To delete an image, select the image number, select *DELETE* (in the *MEMORIES* menu) and then press the **Enter** button. Note that you do not have to delete an image to store another one in the same image memory.

To recall an image, select the image number, select *RECALL* (in the *MEMORIES* menu) and then press the **Enter** button.

When you recall an image, you get what was last stored at that location or nothing (if no settings were ever stored).

Use the *IMAGE DENSITY* control in the *MEMORIES* menu to change the brightness of the image. You must do this before storing it. After the image is stored and recalled, the brightness cannot be changed.

Locking and Clamping the Signal

The following sections describe how to lock and clamp a signal.

Locking the Signal

The MM-410/AVM-510A lets you lock the signal in two ways:

- Narrow — used for normal high-quality signals.
- Wide — used for VCR outputs and other unstable signals.

You can also lock the signal to external sync form a sync source or another signal.

Some signal sources have inherently poor stability, such as the video from consumer-grade VCRs. The MM-410/AVM-510A lets you lock to these unstable signals by switching from narrow locking to wide.

If you find a signal display that jitters back and forth horizontally, use the following procedures to switch to a wide lock:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Enter** button.
3. Select *LOCK* and then press the **Enter** button or turn the knob to change from *NARROW* to *WIDE*.
4. Press **Clr Mnu** to exit.

The signal can also be locked to an external reference. Pressing the **Blue** button and then the **Field Sel** (**Ext Ref**) button changes from one reference to the other.

You can also change to the external reference using the menu path of: *Config*, *REFERENCE* and then selecting *INT/EXT* or using the path of: *Config*, *PICT. REF*, and then selecting *INT/REF*.

Clamping the Signal

The MM-410/AVM-510A also allows two types of clamping: Fast and Slow. Fast clamping removes low frequency components of a signal, such as a 50 or 60 Hz hum. Slow clamping does not remove this hum.

NOTE: The signal display is always clamped to remove dc voltages.

To change clamp speed:

1. Press the **Config** button.
2. Select *INPUT* and then press the **Enter** button.
3. Select *CLAMP* and then press the **Enter** button or turn the knob to change between *SLOW* and *FAST*.
4. Press **Clr Mnu** to exit.

Viewing a Picture with Waveforms

Most waveform montors do not let you view a picture. The MM-410/AVM-510A not only lets you view a picture, but also shows you a safe title area and lets you view a waveform, vector, and picture all at the same time (Figure 7-24). As a result, you are able to monitor the signal parameters you select to make sure they stay within the tolerances you set.

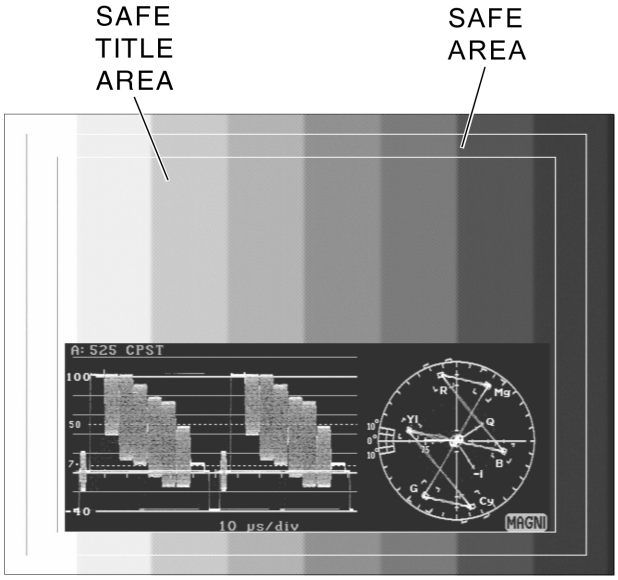


Figure 7-24. Safe Title Area

If you want to see a picture of the signal at any time, push the **Picture** button. Push the **Picture** button a second time to see the picture overlaid with what you were previoulsy looking at. If you push the **Vector** button twice and then push the **Picture** button twice, you will see the picture overlaid with the vector and the waveform. This works with a waveform alone, a vector alone, and with the AVM-510A AUTOMEASURE screen.

The **Split Screen** button brings up another way to see the picture with the waveform and vector. Press the **Split Screen** button once and you will see the waveform and vector in one-quarter normal size positioned at the bottom of the picture (see Figure 7-25).

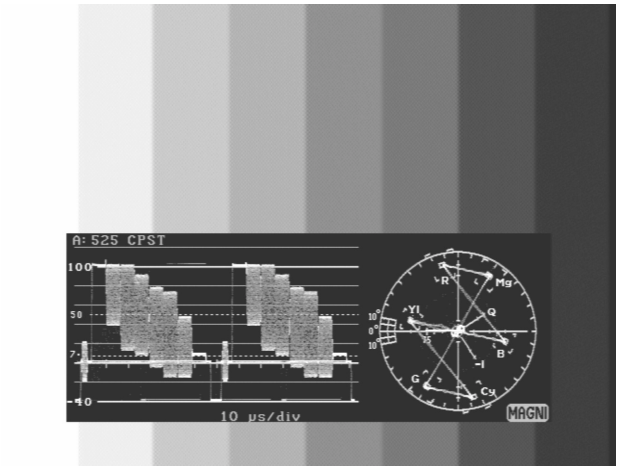


Figure 7-25. Reduced Size Waveform Display

This display offers several choices. For example, the display can show the waveform alone, the vector alone, or both. The background of the waveform/vector can be opaque, so you cannot see the picture through it, or it can be mixed with the picture (see Figure 7-26). To make these choices:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *SPLIT SCREEN* and then press the **Enter** button.
4. Select *REDUCED SIZE DISPLAY* and then press the **Enter** button or turn the knob to select *WFM*, *VEC*, or *BOTH*.
5. Select *REDUCED SIZE MIX* and then press the **Enter** button to toggle between *ON* and *OFF*. Selecting *OFF* makes the display background opaque.
6. Press **Clr Mnu** to exit.

If Split Screen is on when making choices, you will see the changes taking place.

The graticules are simplified in this reduced size display. H and V Mag, H and V Position, Line Sel, Vec. Phase, and Var. Gain all still function normally. You can choose between 1H and 2H sweeps, but 2F sweep is not available in reduced size images when both waveform and vector are displayed.

The picture is normally referenced to itself each time it is displayed, even if *REFERENCE, EXT* is selected. This prevents the picture from shifting up and down, left and right, if the timing of the external sync is very different from the displayed signal. To change the picture to external sync:

1. Press the **Config** button.
2. Select *PICT. REF* and then press the **Enter** button to select *REF*.
3. Press **Clr Mnu** to exit.

Now the reference for the picture follows the main reference, whether it is internal or external. The menu line just above the reference is the same one you change when you press the **Blue** (2nd) button and then the **Field Sel** botton. Note that when a vector is displayed with the picture, the picture reference always goes to internal, regardless of the setting of *PICT. REF*.

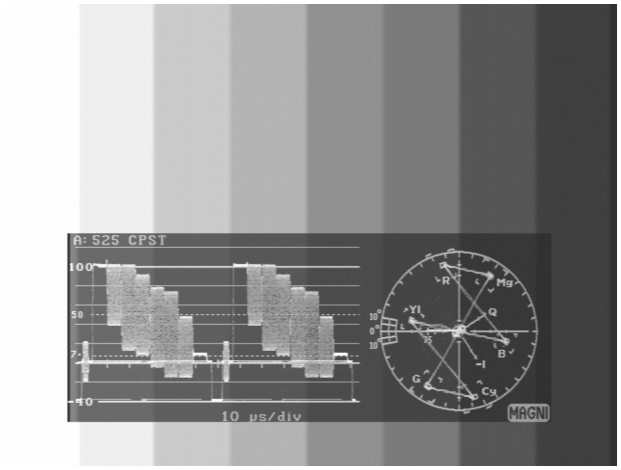


Figure 7-26. Picture Display with Waveform/Vector Mixed

Monitoring Signal Quality with Picture Guard (AVM-510A)

Picture Guard lets you watch a picture while monitoring certain signal elements or parameters. With a System Video measurement screen selected, you can separately enable and disable up to 12 measured items of video picture signal integrity. With Picture Guard enable, if one of the parameters goes outside the tolerances you set, a small, rectangular icon pops up on the picture telling you which parameter of the System Video measurement set has an error (see Figure 7-27).

> **NOTE:** When Picture Guard is enabled, the System Video measurement set, if not selected, will automatically be selected. When Picture Guard is disabled, the measurement set will be automatically changed back to the last measurement set selected while not in Picture Guard.

You can activate Picture Guard using two methods: Press the **Auto Meas** button twice or the **Split Screen** button twice. When you press the **Auto Meas** button the first time, the automeasure screen appears. Pressing the **Auto Meas** button a second time turns Picture Guard on. When you press the **Split Screen** button the first time, the picture with a quarter-size waveform and vector appear at the bottom of the display. Pressing the **Split Screen** button a second time displays Picture Guard if Picture Guard is activated. When Picture Guard is on, there is a small Magni logo in the lower-right corner of the display. This sign shows you Picture Guard is on and not simply looking at the picture

To activate Picture Guard for the **Split Screen** button:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Entr** button.
3. Select *SPLIT SCREEN* and then press the **Entr** button.
4. Select *PICTURE GUARD* and then press the **Entr** button or turn the knob to switch between *ACTIVE* or *DISABLED*.
5. Press **Clr Mnu** to exit.

All the parameters that are monitored by Picture Guard can be found in the System Video automeasurement screen. To view these lists (see Figure 9-1):

1. With an *INPUT A:* or *INPUT B:* selected, press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select *SYSTEM VIDEO* and then press the **Entr** button.
4. Press **Clr Mnu** to exit.

Press the **Auto Meas** button to view a list of parameters that are monitored in Picture Guard. Note the column of small boxes on the extreme left.

- When a box is empty, that signal parameter is not being measured, and that row is gray.
- When the box has a dot in it, that parameter is being measured by the automeasurement system, and that row is bright.
- When the box has a "P" in it, that parameter is being measured and it is being monitored for Picture Guard.

To change the state of a row from empty to a dot or P, press one of the **Arrow** buttons. Afterwards, the box on one of the rows turns green. You can stop on any row and then press the **Entr** button to toggle through the three states.

If a row with a P in it shows the index marker in the red area, the value readout on the right will be red, and the corresponding indicator appears in the Picture Guard display. You can set the limits for the red and green areas as described in Chapter 9, "Automatic Measurement.

After selecting the desired signal parameters to view in Picture Guard, press the **Auto Meas** button again. You should now see the Magni logo in the lower-right corner of the screen. You might also see a small rectangular icon or two indicating any parameter that is out of tolerance.

> **NOTE:** Picture Guard always uses the parameters from the System Video automeasurement screen. If you choose Frequency Response or Color Setup for automeasurement, and then press the **Auto Meas** button twice, to use Picture Guard, the Picture Guard measurements are made with the System Video parameters. The tolerances used are the ones you previously set in the System Video limits. When you press the **Auto Meas** button again, the automeasurement screen reverts to Frequency Response or Color Setup.

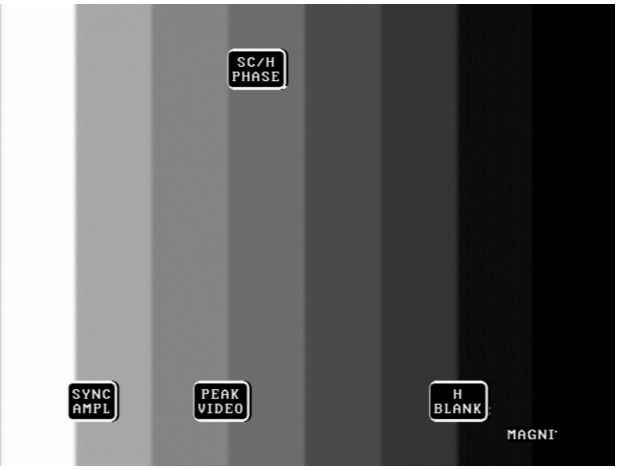


Figure 7-27. Picture Guard Locations

Picture Reference While External Reference is On

The picture is normally referenced to itself when displayed, even if the MM-410/AVM-510A is set to *REFERENCE (EXT)*. This prevents the picture from shifting up and down, left and right, if the timing of the external sync is different from the displayed signal.

When the MM-410/AVM-510A is internally referenced (Ext Ref LED off), the locking source for the waveform, vector, or picture is the signal itself.

When the MM-410/AVM-510A is externally referenced (Ext Ref LED on), the waveforms and vectors are locked on to the signal coming in from the Ext Ref connector at the rear panel.

If you want to look at the picture and have it referenced to itself (so all the colors are correct) or if you want to see the picture locked to the external reference (where changes in the hue and in the horizontal and vertical position tells you something about the relative timing), you can view the picture either way. The picture reference can follow the Ext Ref LED, or it can remain locked to internal.

To change the picture to external sync:

1. Press the **Config** button.
2. Select *PICT. REF* and then press the **Enter** button.
3. Press the **Enter** button to change between *INT* (the picture will always be reference to itself) and *REF* [the picture reference is determined by the state of *REFERENCE* (*EXT*)]. Select *REF*.
4. Press **Clr Mnu** to exit.

The reference for the picture now follows the main reference, whether its internal or external. The menu line just below this reference is the same one you change when you press the **Blue** (2nd) button and then the **2 Field** button.

> **NOTE:** When a vector is displayed with a picture, the vector reference is the same as the picture reference, regardless of the setting of *REFERENCE (EXT)*. The Ext Ref LED lights when *EXT REF* is selected.

Comparing Two Signals with a Picture

A special picture display (A/Ref Split) combines the external reference signal with Input A in one picture, alternating the two in horizontal bands (see Figure 7-28). You can use this display to match the two images for horizontal timing, chroma gain and chroma phase.

In this display the signal from the A Input and the signal on the External Reference connector are compared using a picture-like display. The picture is divided into horizontal bands, with the two inputs occupying alternating bands.

If the two signals are both color bars of the same type, for example, both 75% color bars or both SMPTE bars, any differences will be apparent. Very small timing differences appear as a slight change in hue between the bands. Gain changes look like brightness differences.

The A/Ref Split display is normally disabled. To enable it:

1. Press the **Config** button.
2. Select *DISPLAY* and then press the **Enter** button.
3. Select *SPLIT SCREEN* and then press the **Enter** button.
4. Select *A/REF SPLIT* and then press the **Enter** button to toggle between *ACTIVE* and *DISABLED*.
5. Press **Clr Mnu** to exit.

When A/Ref Split is active, turn it on by pressing the **Split Screen** button. Pressing the **Split Screen** button cycles through the following:

- Reduced size, picture with quarter-size waveform, vector or both
- Picture Guard, if active, showing the Magni logo in the lower right corner.
- A/Ref Split (if active)

Notice that the second two items appear only when they are marked *ACTIVE*. If they are *DISABLED*, they will not appear when the **Split Screen** button is pressed.

To use this display, the video signal must be the same for both inputs. If both sources have color bars, you can do a reasonable job of adjusting by matching the signals with the same live video picture.

Adjust the horizontal timing of one of the two signals to align the bands. Then adjust the timing with a finer control, and then adjust the gain of one signal, to match the color bands exactly. When the two signals are exactly matched for timing and gain, there will be no horizontal bands visible.

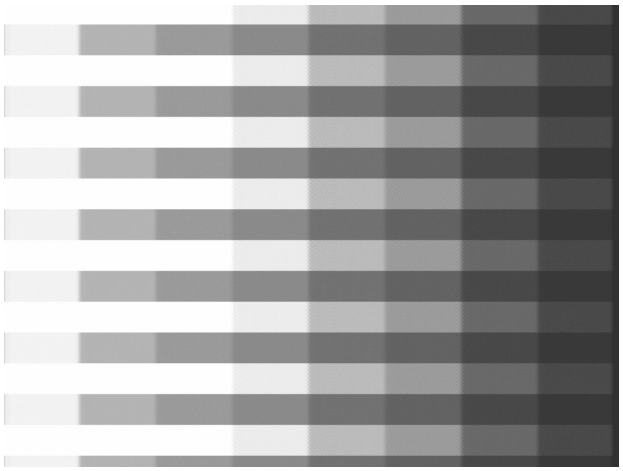


Figure 7-28. A/Ref Split Image

Notes

8. Audio (AVM-510A)

Introduction

In addition to displaying and monitoring video, the AVM-510A Series Automated Video Monitors (AVM-510A) also let you:

- Set audio reference levels
- Display the audio meter
- Audio limit reporting

Audio Reference Levels

The AVM-510A lets you set an audio reference level (see Figure 8-1). The audio meter indicator turns yellow above the 0 reference mark and red when the level exceeds 8 dBu above this set reference mark. The horizontal marks in the audio meter represent 10 dBu increments. Note that the dBu unit is the same as dBm.

To change the audio meter reference level:

1. Press the **Mesmnt** button to access the *Measurement* menu.
2. Select *AUDIO OPTIONS* and then press the **Enter** button.
3. Select *REF LEVEL dB* and then turn the knob to set the appropriate level for the reference marker.
4. Press the **Clr Mnu** button to exit.

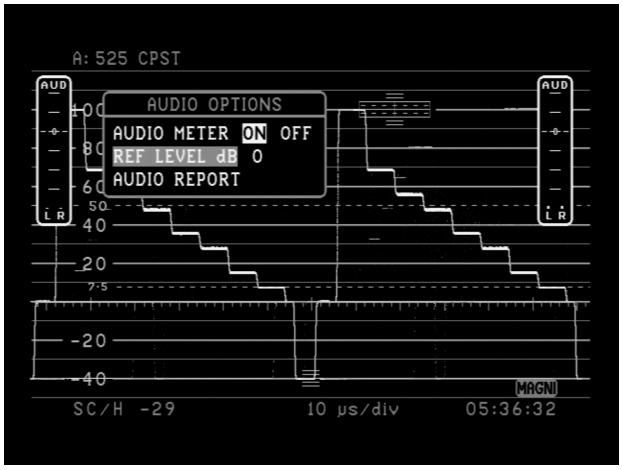


Figure 8-1. Audio Reference Levels Display

Audio Meter

Audio meters can be turned on or off using the *AUDIO METER* menu option. Once selected, the audio meter appears at the left and right of all monitor displays.

To make changes to any of the audio meter options, follow these steps:

1. Press the **Mesmnt** button to access the *Measurement* menu.
2. Select *AUDIO OPTIONS* and then press the **Enter** button.
3. Select *AUDIO METER* and then press the **Enter** button to switch between *ON* or *OFF*. Figure 8-2 shows the *AUDIO METER* menu options.
4. Press the **Clr Mnu** button to exit.

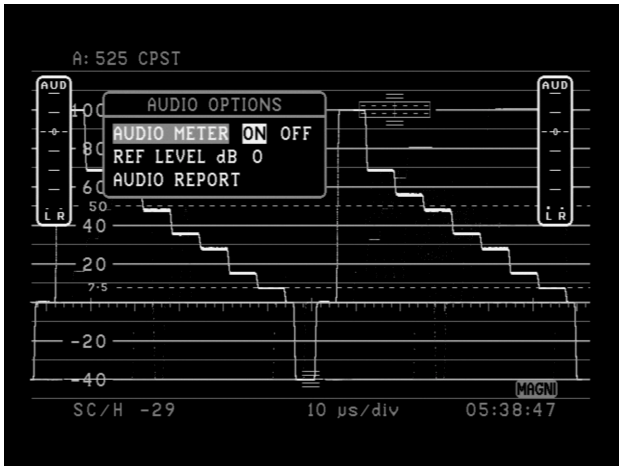


Figure 8-2. Audio Meter Display

Audio Limit Reporting

You can set audio limits to generate a report, activate an alarm, or activate a Picture Guard indicator if audio levels are above or below the set limits for longer than a preset time. The report can include both audio and video and can be initiated by an audio out of limits indication. Audio is included with video reporting if enabled in the audio limit settings.

To enable audio out of limits to initiate a report:

1. Turn on the audio meter. Refer to "Audio Meter" described earlier in this chapter.

   NOTE: For audio automeasure to activate a Picture Guard indicator or activate the Master Alarm, Picture Guard must be turned on.

2. With an Input A: or Input B: signal selected, press the **Mesmnt** button.
3. Select *AUDIO OPTIONS* and then press the **Enter** button.
4. Select *AUDIO REPORT* and then press the **Enter** button.
5. Select *REPORTING* and then press the **Enter** button to switch between *ON* or *OFF*.
6. Press the **Clr Mnu** button to exit.

To set high or low audio limits:

1. Turn on the audio meter. Refer to "Audio Meter" described earlier in this chapter.

   NOTE: For audio automeasure to activate a Picture Guard indicator or activate the Master Alarm, Picture Guard must be turned on.

2. With an Input A: or Input B: signal selected, press the **Mesmnt** button.
3. Select *AUDIO OPTIONS* and then press the **Enter** button.
4. Select *AUDIO REPORT* and then press the **Enter** button.
5. Select *HIGH AUDIO LIMIT* and then press the **Enter** button.
6. Select *HIGH REPORT LIMIT* and then turn the knob to set the desired limit (-20 to 10 dB).
7. Select *HIGH ALARM DELAY* and then turn the knob to set a time that the audio must be above the high audio limit to initiate an alarm or report (0 to 30 seconds).
8. Press the **Prev Mnu** button, select *LOW AUDIO LIMIT*, and then press the **Enter** button.
9. Select *LOW REPORT LIMIT* and then turn the knob to set the desired limit (-40 to -20 dB).
10. Select *LOW ALARM DELAY* and then turn the knob to set a time that the audio must be above the low audio limit to initiate an alarm or report (0 to 30 seconds).

9. Automatic Measurement (AVM-510A)

Introduction

Automeasurement uses the full power of the AVM-510A Series Automated Video Monitors (AVM-510A) signal processing capabilities. Automeasurement is a flexible system that can take specific kinds of measurements on the most common types of test signals and present these measurements as graphs, as numerical values, and as a red (out of limits) or green (within limits) indications.

Automeasurement Screen Elements

Figure 9-1 shows a typical automeasurement screen. The screen consists of a series of horizontal graphs, each labeled with the name of the measured parameter, such as *SYNC AMPL*, *PEAK VIDEO*, or *SC/H PHASE*. The horizontal bars are red at the ends and green in the center with a red or green vertical mark somewhere on the line.

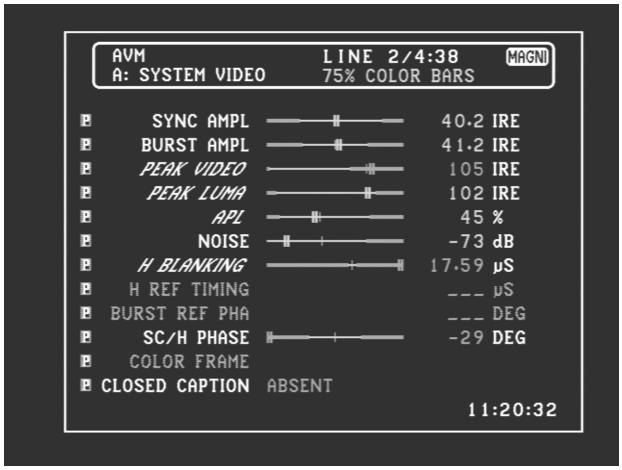


Figure 9-1. Typical Automeasurement Screen

The red ends of the line indicate the out-of-tolerance area. The green, in the middle, indicates the area of measurement that is within the set tolerances. The vertical mark indicates the current reading.

At the right of the screen is the actual measurement with the units. If the current measured value is within tolerance, the vertical mark and the numerical value will be green; otherwise, the vertical mark and numerical value will be red.

On the extreme left side is a series of boxes, some with a single dot, some with a “P,” and some empty. They indicate the following:

- Single Dot — current value being measured.
- P — current value being measured and monitored by Picture Guard.
- Empty — current value is not being measured (no graph or numerical value displayed).

To change the state of a parameter line, press one of the **Arrow** buttons. Afterwards, one of the squares turns green. Use the **Arrow** buttons to move the green up or down. Next, press the **Entr** button to change the state from empty to a dot, and for some parameters, to P. Note that many of the parameters are not available in Picture Guard, as a result, the P state does not appear in those areas after you press the **Entr** button.

NOTE: Only the parameters in the System Video automeasure screen are available in Picture Guard. Picture Guard always uses the System Video parameters.

At the top-center of the screen is a field and line number. This is the line that is sampled and measured. To change the line, press the **Line Select** button and then turn the knob. If the Line Select LED is lit, pressing the **Line Select** button changes the field.

- If the signal name is in green, the AVM-510A determines what the signal is.
- If the signal name is in red, the AVM-510A cannot determine what the test signal is.
- If the signal name is white, you have determined what the signal is.

The names of the parameters also have special meaning. If the name, such as *Peak Video* is in italics, the parameter is being measured on all active lines, regardless of the line number that appears at the top of the screen. Names not in italics are measured only on the selected line.

Additional Measurement Definitions

APL	Average of the active video part of 10 lines sequenced through the field.
Close caption	Indicates the presence or absence of the closed caption signal on line 21.
H blanking	Indicates the width of horizontal blanking at its narrowest point throughout the field.
Diff phase	Boxes show phase difference between the chroma reference and each step. Any step exceeding 2 degrees shows a + or -. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error and turns red if the limit is exceeded.
Diff gain	Boxes show amplitude difference between the chroma reference and each step. Any step exceeding 2 percent shows a + or -. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error and turns red if the limit is exceeded.
Lum linearity	Boxes show amplitude difference between the average of the steps (last step minus the blanking divided by the number opf steps) and each step. Any step exceeding 2 percent shows a + or -. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error and turns red if the limit is exceeded.

Test Signal Measurement Sets

Three basic composite test signal measurement sets are available with the AVM-510A. Two of the measurement sets are associated with common test signals, such as color bars and multiburst signals. The third measurement set is for live video. The test signal measurement sets can be applied to several test signals, for example, 75% or 100% color bars. You can let the AVM-510A sample a test signal and automatically apply a measurement set, or you can force the AVM-510A to apply a measurement set and then force it to accept one of the test signals. The System Video measurement set is designed to measure live video signals.

The Color Bars set is associated with 75% full field color bars, 100% color bars, and (in NTSC) SMPTE bars. The Frequency Response measurement set is associated with various multiburst signals.

NOTE: The AVM-510A does not support any measurement sets for component signals.

The following table lists the types of measurement sets and the test signals normally used.

Measurement Set	**Test Signals**	
Type	525 Systems	625 Systems
System video	Live program video	Live program video
Color measure	75% color bars 100% color bars 75% SMPTE bars	75% color bars 100% color bars
Frequency response	FCC multiburst Custom mulitburst	CCIR 18 Custom mulitburst
Non-linear measure	FCC composite NTC7 composite	CCIR 17/330 National ITS
Transmitter (AVM-510A-T)	FCC composite NTC7 composite	CCIR 17/330 National ITS

Some measurement set parameters (measured parts of the signal) are common to all measurement sets, such as Sync Ampl and Burst Ampl. Other measurement set parameters are specific to one measurement set. For example, APL is a parameter only measured in the System Video set. Each measurement set has a specific line on which it will make the measurements. You select this line. You can also select a different line for each measurement set. The following choices affect the way automeasurement operates:

- **Automeasurement Set** — This menu selection called *AUTOMEASURE/AUTO MEAS SET* enables the AVM-510A to sample an incoming signal on the designated line, determine what test signal is available, and then apply the appropriate measurement set, either Color Setup or Frequency Response.

  NOTE: System Video is never applied when *AUTOMEASURE/AUTO MEAS SET* is selected.

- **Selecting a Specific Measurement Set** — Selecting a specific measurement set lets you use this measurement set but still allows the AVM-510A to automatically determine the test signal. For example, you can select Color Setup even if the signal is multiburst. You can also use System Video parameters, however, you must specifically select that set.

- **Forcing a Test Signal** — Forces the AVM-510A to apply a specific chosen measurement set to the signal. In this case, the AVM-510A assumes that the test signal is the one you selected. You might make this selection if the signal is weak or noisy so the AVM-510A can detect the signal.

- **Forcing Live Video** — The choice usually used with System Video allows all System Video parameters to be measured on a live video signal. In the two other measurement sets, forcing Live Video causes the AVM-510A to measure only those parameters that can be measured on a live video signal, such as Burst Ampli and Peak Video. The other parameters are grayed out or turned off.

  The measurement set can be applied to a line in the vertical interval or to an active video line. If you are testing a live video signal that has test signals in the vertical interval, you might want to select a line with a test signal on it or you might want to measure live video in the active part of the picture. If you are testing a full-field test signal, you can select any line in the active area.

Automeasurement Set

The quickest way to take automatic measurements is to use the *AUTOMEASURE/AUTO MEAS SET* menu option. Selecting this option enables the AVM-510A to automatically determine what test signal is present on the line you select, and then applies the measurement set that yields the best test results.

To select the *AUTOMEASURE/AUTO MEAS SET* menu option:

1. Press the **Mesmnt** button to access the *SELECT SET* menu.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select *AUTOMEASURE/AUTO MEAS SET* and then press the **Entr** button.
4. The only selection in this menu is *MEASURE LINE*. Turn the knob to select the line that has a test signal. You can turn through the end of one field and into the next field, or you can switch fields by pressing the **Field Select** button.
5. Press the **Clr Mnu** button to exit.

   NOTE: Usually when you choose something from a menu, it is enough to locate the item, select it, and then exit the menu. This is not the case with measurement sets. Whether you are choosing a specific measurement set or *AUTOMEASURE/AUTO MEAS SET*, you must first press the **Entr** button to make your choice take effect.

Use caution when operating the AVM-510A in *AUTOMEASURE/AUTO MEAS SET* mode. The AVM-510A recognizes a certain list of test signals. If the test signal is not from this list, the AVM-510A displays the notice Any Signal (Auto) near the top of the automeasurement screen.

In some cases the AVM-510A might recognize a test signal in error. For example, in NTSC, the AVM-510A cannot determine whether 75% color bars has or does not have setup. In this case, the measurement set might give false readings.

As a result, always press the **Wfm** button for a quick look at the signal to verify that the AVM-510A has recognized the correct signal. If measuring a test signal in the vertical iterval, press the **Line Select** button and select the same line (as listed on the measure screen) to see the correct waveform. Note that the line select number and the line selected in step 4 above are not related.

When using *AUTOMEASURE/AUTO MEAS SET* mode, the AVM-510A recognizes these signals:

Test Signals	
525 Systems	625 Systems
75% color bars, with setup 100% color bars, with setup SMPTE color bars*	75% colour bars 100% colour bars
FCC multiburst	CCIR 18
FCC composite NTC7 composite	CCIR 17* & CCIR 330* National ITS

Note that when selecting a line number for SMPTE Color Bars, CCIR 17, and 330:

- 75% SMPTE Bars is never a vertical interval signal. It is made up of three separate signals in one frame. If the signal you are measuring is SMPTE Color Bars, you can select any line in the active video area. The AVM-510A will then recognize it as SMPTE Color Bars and then look for a setup in the lower part of the field.
- CCIR 17 and CCIR 330 are found on the same line number in opposite fields. The AVM-510A uses CCIR 17 for some of the measurements and CCIR 330 for others. However, if the signal is a full field CCIR 17 or CCIR 330, and you selected a line in the active video area, the other signal will not be in the other field. In this case, some of the sampling produces error measurements, even though the signal is correct.

The limits that are applied when using *AUTOMEASURE/AUTO MEAS SET* are the same limits that are established in one of the specific measurement sets. For example, set the Sync Ampl limits in the Color Setup measurement set to 38 and 42 IRE, select *AUTOMEASURE/AUTO MEAS SET* from the *SELECT SET* menu, and then select line 17. If the signal on line 17 is a color bar, Color Setup is applied, and the limits from the Color Setup measurement set is used.

NOTE: The measurement set that is applied to the signal is the last measurement set selected from the *SELECT SET* menu. The line number used is also from the applied measurement set.

Forcing a Measurement Set Selection

In some cases you might want to force the AVM-510A to apply a specific measurement set to a test signal. For example, a noisy signal or you want to apply some tests that are available in one measurement set to a different signal.

You can force automeasurement at two levels:

- Force automeasurement to apply a specific measurement set to the signal, but still allow the AVM-510A to determine what test signal is present on the selected line.
- Force the AVM-510A to apply a specific measurement set and force it to recognize the signal. For example, CCIR 18, whether or not the signal is CCIR 18.

To force the AVM-510A to use a specific measurement set:

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select the appropriate measurement set and then press the **Entr** button. This forces the AVM-510A to use the selected measurement set.
4. Select *MEASUREMENT LINE* and then turn the knob to specify the line that you want measured. Note that you can turn the knob through the end of one field and into the next, or press the **Field Select** button to change fields. The line number takes effect at the time it is selected.

   NOTE: The line selected in step 4 has no relationship to the line selected for waveforms using the **Line Select** button.
5. Select *SIGNAL ID* and then turn the knob, or press the **Entr** button several times, to select one of the following:
   - *AUTO SIG ID* lets the AVM-510A determine what signal is on the selected line.
   - A specific test signal that forces the AVM-510A to treat the signal as though it were this signal and no other. If the selected signal is one that is normally used in the selected measurement set, all the parameter lines will be active, whether or not they produce meaningful measurements. If the signal is from another set, some parameters will be inactive (gray).
   - *LIVE VIDEO* inactivates most of the parameters in the Color Setup or Frequency Response measurement sets, leaving only those that are applicable to active video. The System Video measurement set is designed to measure Live Video, so all parameters are active.
6. Press the **Clr Mnu** button to exit.

In step 3, you selected a specific measurement set when you pressed the **Entr** button. That is the measurement set that will be applied each time you push the **Auto Meas** button. If you selected a specific test signal (step 5), that is the test signal that will be recognized by the AVM-510A when you use that measurement set.

If you select *AUTOMEASURE/AUTO MEAS SET* (step 3) instead of a specific measurement set, this overrides any test signal you selected in step 5. For example, if you select *AUTOMEASURE/AUTO MEAS SET*, and the AVM-510A detects CCIR18 on the selected line, it applies the Frequency Response measurement set and recognizes the signal as CCIR 18, even if the *FREQUENCY RESP* set was set to 75% Color Bars. However, the limits you established for that measurement set are the ones applied to the test signal. *AUTOMEASURE/AUTO MEAS SET* has no way to change the limits.

Setting Automeasurement Limits

The *AUTOMEASURE/AUTO MEAS SET* menu lets you set measurement limits over very wide ranges. You can set different limits for Input A: and Input B:, for 525 and 625 systems, and for different component systems.

After setting the limits for any measurement set, the green (safe) area changes in the bar graph. You can set the limits for each parameter, and anything else you set is saved for that measurement set on that input for that system (525 or 625).

There are separate limits for Input A: and Input B:, separate limits for 525 and 625 systems (even for the same input), and separate limits for each of the measurement sets as listed in the following table.

List of Different Measurement Sets
(There is a different set of limits for each of these combinations)

525 Signals		625 Signals	
Input A:	Input B:	Input A:	Input B:
System video	System video	System video	System video
Color setup	Color setup	Colour setup	Colour setup
Frequency response	Frequency response	Frequency response	Frequency response
Non-linear (N & T)	Non-linear (N & T)	Non-linear (N & T)	Non-linear (N & T)
Transmitter (T)	Transmitter (T)	Transmitter (T)	Transmitter (T)

You can set the limits when you are viewing the automeasure screen or when any other display is active. To set the limits for any measurement set:

1. Select an Input A: or Input B: signal input.

   NOTE: If Input B: is selected, make sure it is configured for composite or S-video. There is no measurement set for component signals in the AVM-510A.

2. Press the **Mesmnt** button.
3. Select *SELECT SET* and then press the **Entr** button.
4. Select the appropriate measurement set and then press the **Entr** button.
5. Select *MEASURE LINE* and then turn the knob to select the line where the test signal will be found. Press the **Field Select** button if you need to switch fields.
6. Push the down **Arrow** button twice to highight *LIMITS*, which has the name of the measurement set and the input letter.
7. Press the **Entr** button.

   Four columns now appear on the display. On the left is the *MEASUREMENT* parameter. The other three columns show the minimum and maximum limits and the nominal values. Note that some parameters have a maximum only.

8. Using the **Arrow** buttons, move the cursor up and down to highlight the desired parameter.

9. Press the **Entr** button to move the cursor to the *MIN* column and then turn the knob to set the minimum acceptable value.
10. Press the **Entr** button to move the cursor to the *MAX* column and then turn the knob to set the maximum acceptable value.

    While in the *MIN* and *MAX* columns, the **Arrow** buttons switch the cursor back and forth between them. Pressing the **Entr** button moves the cursor from *MIN* to *MAX*, or from *MAX* out and down to the next parameter name (step 8). Pressing the **Prev Mnu** button moves the cursor to the parameter in the current row.
11. After setting all acceptable values, press the **Clr Mnu** button to exit or press the **Prev Mnu** button twice to go back and select another measurement set.

    NOTE: Composite and S-video limits are the same. Whatever limits are set for Input A: composite using a 625 signal in the Color Setup limits will also be used when Input A: detects an S-video 625 signal and the Color Setup measurement set is used.

Special Considerations for MultiBurst

The AVM-510A recognizes two standard multiburst signals (FCC multiburst in NTSC and CCIR 18 in PAL) but can also be set up to automeasure a non-standard multiburst signal. If you want to automeasure a multiburst signal, you need to set the AVM-510A up to detect either a standard multiburst or a custom multiburst signal. The following table lists all the applicable combinations.

Automeasurement Setup			Applied Signal		
Controlling Measurement Set	**Multiburst ID Setting**	**Frequency Response Signal ID Setting**	**FCC Multiburst**	**CCIR 18**	**Multiburst of Another Type**
			What the AVM-510A Recognizes		
AUTO MEASURE/ AUTO MEAS SET	Auto detect	Any setting	FCC multiburst	CCIR 18	Multiburst
AUTO MEASURE/ AUTO MEAS SET	Standard	Any setting	FCC multiburst	CCIR 18	CCIR 18 or FCC multiburst
AUTO MEASURE/ AUTO MEAS SET	Custom	Any setting	Custom	Custom	Custom
Frequency response	Auto detect	*AUTO SIG ID*	FCC multiburst	CCIR 18	Multiburst
Frequency response	Standard	*AUTO SIG ID*	FCC multiburst	CCIR 18	CCIR 18 or FCC multiburst
Frequency response	Custom	*AUTO SIG ID*	Custom	Custom	Custom
Frequency response	Any setting	CCIR 18 or FCC multiburst	FCC multiburst	CCIR 18	CCIR 18 or FCC multiburst
Frequency response	Any setting	Multiburst	Custom	Custom	Custom

Under the main *MEASUREMENT* menu is a sub-menu called *MULTIBURST ID*. This is the key to multiburst signal detection when using *AUTOMEASURE/AUTO MEAS SET*. Three selections under *MULTIBURST ID* are available:

- **STANDARD** (FCC multiburst or CCIR 18) — If the AVM-510A detects a multiburst signal of any kind, it assumes it is one of these two standards, depending on the line rate of the signal.
- **CUSTOM** — This is a non-standard, custom multiburst that you define as described in the following section "Setting Timing for Multiburst." If the AVM-510A detects a multiburst of any kind, it assumes it is a custom multiburst, and will take measurements according to the timing and frequency established under the *FREQUENCY RESP* menus *MULTIBURST TIMINGS* and *PACKET FREQUENCIES*.
- **AUTO DETECT** — When selected, the AVM-510A automatically chooses between *STANDARD* or *CUSTOM*. If the AVM-510A senses that the multiburst is one of the standards, it applies the built-in timing and packet frequencies. If the AVM-510A senses a multiburst that is not standard, it applies the custom timing and packet frequencies.

When using the Frequency Response measurement set and the Frequency Response signal ID is set to *AUTO SIG ID*, the *MULTIBURST ID* has control, just as it does when *AUTOMEASURE/AUTO MEAS SET* is used.

If the Frequency Response signal ID is set to anything other than *AUTO SIG ID*, it forces the AVM-510A to recognize the signal as it is named by the Frequency Response signal ID.

Setting Timing for Multiburst

Multiburst signals are variable. They have different frequency packets that start at different points along the line. The peak-to-peak amplitudes vary from one standard multiburst signal to another. The AVM-510A lets you set up a custom standard for a non-standard multiburst signal and apply all the parameters of the Frequency Response measurement set to it.

This section explains how to set variables for a custom multiburst signal. To set the variables, use the following two-step process:

> **NOTE:** Prior to setting variables, the AVM-510A is used to determine the starting time (from the leading edge of sync) of the bar, the pedestal, and each frequency burst or packet, and the frequency of each packet.

The first step is to find out the timing of each signal part:

1. Look at the multiburst signal as a waveform. Use the **1H** sweep rate. Note that the major graticle divisions represent 5 µs increments (see Figure 9-2).

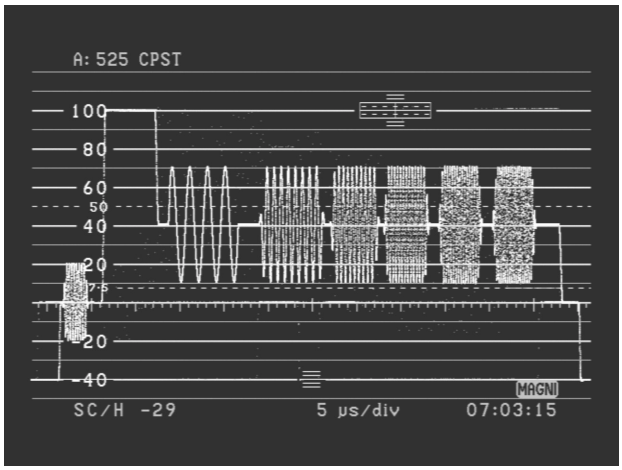


Figure 9-2. 1H Sweep, Left Line

2. Use the **H POS** knob to move this wide, two-line display so the center sync pulse is near the left side of the screen. You should now see one line all the way across the screen with a sync pulse at the left.
3. Move the waveform up and left-right so the midpoint of the leading edge of sync is exactly on one of the major graticule marks (see Figure 9-3).

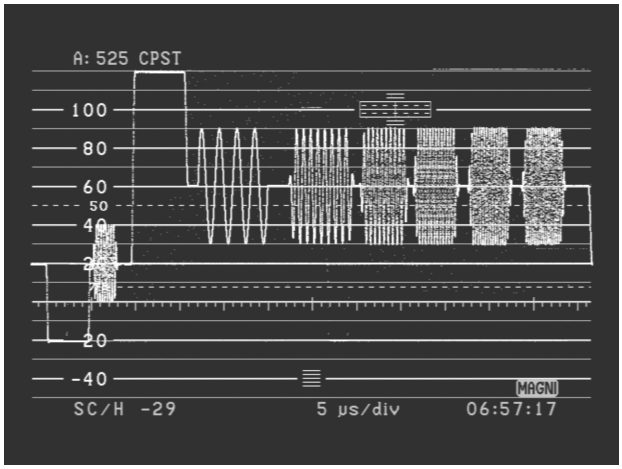


Figure 9-3. Leading Edge on Major Mark

4. Using only the **V POS** knob (do not touch the **H POS** knob), move the waveform up and down and then write down the timing measurements for each of the following (see Figure 9-4):
   - Beginning of the white bar
   - Beginning of the pedestal after the white bar
   - Beginning of each of the frequency packets

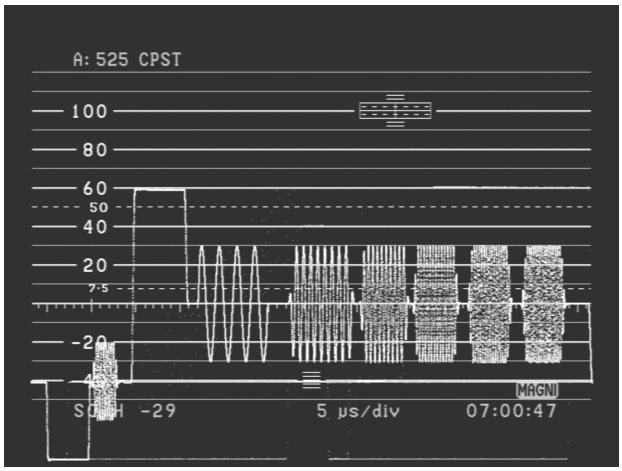


Figure 9-4. Measuring the Times

Once you have all the figures, continue with the second step of the proccess:

1. Select the appropriate signal input (Input A: or Input B:).
2. Press the **Mesmnt** button.
3. Select *SELECT SET* and then press the **Entr** button.
4. Select *FREQUENCY RESP* and then press the **Entr** button.
5. Select *MULTIBURST TIMINGS* and then press the **Entr** button.
6. Select *BAR* and then turn the knob to set the timing to 1 µs more than the value you measured on the multiburst signal.
7. Continue with *PEDESTAL* and each Packet, setting the time to 1 µs more than the value you mesasured on the signal.
8. Press the **Prev Mnu** button.
9. Select *PACKET FREQUENCIES* and then press the **Entr** button.

10. Select each of the packets and then turn the knob to set the frequency, in 0.1 MHz increments, to the frequency of that packet in the multiburst. Note that the frequencies shown in the automeasurement display does not change to reflect your entry here. However, the measurement system must have the correct frequency to operate properly.

11. Press the **Clr Mnu** button to exit.

Now when the AVM-510A selects *MULTIBURST TIMINGS* instead of FCC multiburst or CCIR 18, it uses these timing measurements to analyze the signal. These values remain as they are until you change them, or until you do a full system reset.

NOTE: The multiburst timing and packet frequency can be set differently for input A:, Input B:, and for 525 and 625 line systems. As a result, there are four sets of multiburst timing and packet frequency that the AVM-510A can store; however, these values are not stored in the 10 front panel memories.

Automeasurement with Live (Program) Video

The System Video measurement set is designed for measuring program (live video) signals. The Color Setup and Fequency Response measurement sets can also be used on live video, but they have limited results.

The System Video measurement set is the one most used on live or program video. You must specifically select this measurement set, it cannot be selected automatically using *AUTOMEASURE/AUTO MEAS SET*. Measurement of program video is different from measurement of test signals. Some of the measurements are made on all active lines instead of on a specifically selected line. These include:

- **Peak Video** — The highest point reached by any video, including chrominance, on any active line.
- **Peak Luma** — The highest point reached by the liminance video on any active line. Luminance video is the video that would result from passing in through the luma filter.
- **APL** — Average Picture Level. The average of the active picture area, including chroma. This measurement is taken in blocks of 10 lines, sequenced through the picture, so it will vary as the measurements are taken in differenct parts of the picture.
- **H Blanking** — Horizontal blanking is measured at the H Blanking Level. It is the distance (time) between the last video at that level on any active line to the first video at that level on any active line. The H Blanking Level is set in the *SYSTEM VIDEO LIMITS* menu.

Measurement Parameters Used with Live Video					
Parameters	System Video	Color Setup	Frequency Response	Non-Linear	Transmitter
SYNC AMPL	X	X	X	X	X
BURST AMPL	X	X	X	X	X
PEAK VIDEO	X				X
PEAK LUMA	X			X	
APL	X				X
NOISE	X			X	X
H BLANKING	X				
H-REF TIMING	X				
BURST REF PHA	X				
SC/H PHASE	X				
COLOR FRAME	X				
BAR AMPL		X	X	X	
WHITE BAR AMPL					X
BLANKING LEVEL					X

The other measurements (not in italic) are made on the line shown at the top of the measurement screen and chosen with the **Line Select** and **Field Select** buttons (see Figure 9-5). The one exception is noise. This parameter is measured on its own special line.

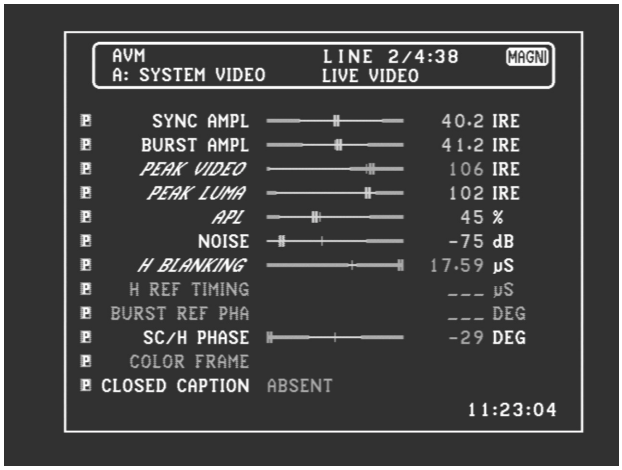


Figure 9-5. System Video Measurement Set with Live Video

To select the noise measurement line:

1. Press the **Mesmnt** button.
2. Select *NOISE LINE* and then turn the knob to select a line between 10 and 35.
3. Press the **Clr Mnu** button.

The other measurement sets (Color Setup, Frequency Response, and Non Linear) can also sample live video when forced to do so. Depending on which measurement set has been selected, only certain ones of the parameters *SYNC AMPL*, *BURST AMPL*, *PEAK LUMA*, *NOISE*, and *BAR* or *WHITE BAR AMPL* remain active. To force any of these measurement sets to sample live video:

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select the appropriate signal format and then press the **Entr** button.
4. Select the appropriate measurement set and then press the **Entr** button.

   NOTE: *AUTOMEASURE/AUTO MEAS SET* cannot be applied to live video. *AUTOMEASURE/AUTO MEAS SET* automatically selects the Color Setup, Frequency Response, or the Non Linear measurement set. If it does not recognize the signal, it selects System Video as the measurement set.
5. Select *SIGNAL ID* and then turn the knob until the words *LIVE VIDEO* appear on the display.
6. Press the **Clr Mnu** to exit.

   NOTE: System Video is the measurement set used by Picture Guard.

Automatically Reporting Measurements

The reporting feature sends measurement data to a PC file or to a printer at scheduled intervals. You can run reporting all day or for just part of the day. Errors can be reported as they occur and as all errors are cleared. This section explains how to configure the AVM-510A to generate a report. The sections that follow explain how to configure a PC or printer to accept reports, and how to schedule a report.

A report is a printout, either on paper or in an ASCII computer file, of the current measurements. A report can be generated by any of the following events:

- It is time for a scheduled report
- A new error occurs
- A previously reported error is still an error after a period of time
- All errors have been cleared (no errors now)
- The video signal is lost (no sync)
- The video signal returns

Reports can be sent to a PC to be displayed on its monitor screen and saved as an ASCII text file. In this configuration, the AVM-510A RS-232 computer interface is connected to one of the computer's serial ports using a 9-pin cable. Reports can also go directly to a serial printer, and a page of the measurement is printed each time there is a full page of data. This configuration uses the AVM-510A RS-232 modem interface and a 9-pin serial cable.

To set up the AVM-510A and a PC for sending reports to an ASCII text file:

1. Connect a 9-pin serial cable between the AVM-510A RS-232 computer interface and a PC.
2. Press the **Config** button.
3. Select *OTHER* and then press the **Entr** button.
4. Select *SERIAL PORTS* and then press the **Entr** button.
5. Select *COMPUTER PORT* and then turn the knob or press the **Entr** button until you see *REPORT*.
6. Select *COMPUTER SETUP* and then press the **Entr** button.
7. Select *BAUD RATE* and then turn the knob to select the baud rate used by the computer's communications program.
8. Select *HANDSHAKING* and then turn the knob or press the **Entr** button to select *XON/XOFF*.
9. Press the **Clr Mnu** button to exit.

To set up the AVM-510A and a printer for sending reports to a printer:

1. Connect a 9-pin serial cable between the AVM-510A RS-232 modem interface and a printer.
2. Press the **Config** button.
3. Select *OTHER* and then press the **Entr** button.
4. Select *SERIAL PORTS* and then press the **Entr** button.
5. Select *MODEM PRINTER PORT* and then turn the knob or press the **Entr** button until you see *REPORT*.
6. Select *PRINTER SETUP* and then press the **Entr** button.
7. Select *PRINTER TYPE* and then turn the knob or press the **Entr** button until your printer type appears.
8. Select *BAUD RATE* and then turn the knob to select the baud rate used by the printer.
9. Select *HANDSHAKING* and then turn the knob or press the **Entr** button to select *XON/XOFF*.
10. Press the **Clr Mnu** button to exit.

Sending Reports to a PC

To send measurement reports from the AVM-510A to a PC:

1. Follow the procedures previously described in "Automatically Reporting Measurements."
2. Press the **Mesmnt** button.
3. Select *REPORT* and then press the **Entr** button.
4. Select *ERROR REPORTING* and then press the **Entr** button to select *ON*.
5. Select *REPORT SUSTAINED ERRORS* and then turn the knob until it shows *1 Minute*.
6. Press the **Prev Mnu** button.
7. Select *SELECT SET* and then then press the **Entr** button.
8. Select *SYSTEM VIDEO* and then press the **Entr** button.
9. Select *SYS VIDEO LIMITS* and then press the **Entr** button.
10. Select *SYNC AMPL* and then press the **Entr** button to place the cursor in the *MIN* column.
11. Turn the knob clockwise until the reading is well above 40 IRE (300 mV). Press the **Clr Mnu** button, and then press the **Mesmnt** button to display the automeasure screen. An error should appear in the *SYNC AMPL* line.

In approximately 20 seconds you should see on your PC screen a series of measurements with the title "New Error." Every minute after this you should see a new list of measurements with the title "Sustained Error." If, after 2 minutes, you do not see anything on the PC screen, something is set up wrong between the AVM-510A and the PC. Check the cabling and all the settings in the AVM-510A menus and the PC's communications program.

Sending Reports to a Printer

To send measurement reports from the AVM-510A to a printer:

1. Follow the procedures previously described in "Automatically Reporting Measurements."
2. Press the **Mesmnt** button.
3. Select *REPORT* and then press the **Entr** button.
4. Select *ERROR REPORTING* and then press the **Entr** button to select *ON*.
5. Select *REPORT SUSTAINED ERRORS* and then turn the knob until it shows *1 Minute*.
6. Press the **Prev Mnu** button.
7. Select *SELECT SET* and then then press the **Entr** button.
8. Select *SYSTEM VIDEO* and then press the **Entr** button.
9. Select *SYS VIDEO LIMITS* and then press the **Entr** button.
10. Select *SYNC AMPL* and then press the **Entr** button to place the cursor in the *MIN* column.
11. Turn the knob clockwise until the reading is well above 40 IRE (300 mV). Press the **Clr Mnu** button, and then press the **Mesmnt** button to display the automeasure screen. An error should appear in the *SYNC AMPL* line.

In approximately 20 seconds you should see a light flashing on your printer signaling you that data is being sent from the AVM-510A. You should start to see printed a series of measurements with the title "New Error." Every minute after this you should see printed a new list of measurements with the title "Sustained Error." If, after 5 minutes, you do not see anything from the printer, something is set up wrong between the AVM-510A and the printer. Check the cabling and all the settings in the AVM-510A menus and the printer menus.

Scheduling Reports

There are several options available to you when scheduling a report. The reporting process can operate all the time or during a specified period of the day. Reporting can be at regular intervals, or when there is an error, or both. Continuing errors can be reported at specified intervals. Afterwards, you can get a special report after all errors have been cleared.

To schedule a report:

1. Press the **Mesmnt** button.
2. Select *REPORT* and then press the **Entr** button.
3. The following *REPORT* menu appears on the display:

- *START/STOP TIME SETUP*
- SCHEDULED REPORT INTERVAL (0 off to 480 minutes)
- *ERROR REPORTING* (ON/OFF)
- *REPORT SUSTAINED ERRORS* (0 off to 60 minutes)
- *REPORT ALL ERRORS CLEAR* (ON/OFF)
- *REPORTING DELAY* (ON/OFF)

START/STOP TIME SETUP

Select an item in this menu to set it with the knob, press the **Entr** button, or drop into its sub-menus by pressing the **Entr** button. The sub-menus found under this selection (by pressing the **Entr** button) let you turn reporting on for a specific part of the day. If the *START/STOP FUNCTION* is off, the rest of this sub-menu has no effect. If the *START/STOP FUNCTION* is on, set the start and stop time for reporting by selecting the two lower slections (one at a time) and then by turning the knob for hours and minutes. When *START/STOP* is on, the remainder of the *REPORT* menu is active only between the start and stop times. When *START/STOP* is off, all remaining selections in the *REPORT* menu work all the time.

START REPORT TIME

Select *START REPORT TIME* and then press the **Entr** button.

This selection lets you set (by turning the knob) a *START REPORT TIME* in hours and minutes by selecting *HOURS* and then *MINUTES*.

STOP REPORT TIME

Select *STOP REPORT TIME* and then press the **Entr** button.

This selection lets you set (by turning the knob) a *STOP REPORT TIME* in hours and minutes by selecting *HOURS* and then *MINUTES*.

SCHEDULED REPORT INTERVAL

Select this item and then turn the knob to set this selection for any time between 5 minutes and 480 minutes (8 hours). Reporting occurs at these intervals, starting immediately. The report ocurs whether there is an error or not. If you set this item to 0 (*OFF*), just below the 5 minute point, periodic reporting does not occur at all, and you will only see error reporting (if error reporting is enabled).

ERROR REPORTING

If selected, every time a new error occurs, another report is generated. This is in additon to any other scheduled reports. When a new error occurs, the AVM-510A waits approximately 10 seconds before sending a set of measurement data to a PC or printer. This prevents several, nearly simultaneous errors from generating several printouts. However, the time of each error is noted next to it in the data set. Note that each time a front panel control is moved or changed, the AVM-510A waits 20 seconds before taking any measurements.

REPORT SUSTAINED ERRORS

When an error occurs, the AVM-510A normally generates a report. To keep generating reports while the error is still there, set this option anywhere from 1 to 60 minutes. If this selection is set to 3 minutes, a new report is generated every 3 minutes, as long as the error keeps occuring. If this selection is set to 0 (*OFF*), errors will be reported only when they first occur.

NOTE: This function initiates a report after a set interval if *ERROR REPORTING* is disabled.

REPORT ALL ERRORS CLEAR

If this selection is enabled, a special report is generated when all errors are cleared. All measurements are given in this report. Note that if there are three errors and one of them clears, this condition is not given in the special report.

NOTE: This function operates only if *ERROR REPORTING* is enabled.

REPORTING DELAY

Lets you turn ON/OFF *REPORTING DELAY*. Refer to “ERROR REPORTING” described earlier in this chapter.

About Reporting

1. If the video signal is lost, a loss of video signal report is immediately generated and no measurements are given. When video is restored, a reacquired video signal report is generated along with the appropriate measurements.
2. Out of tolerance conditions are registered immediately, but they are not reported to the printer or PC for a few seconds. This enables the AVM-510A to make sure that all errors are reported. If the AVM-510A does not wait, and 5 errors occurred within milliseconds of each other, a complete report is generated for each of these errors, listing all the measurements each time.
3. If any control on the front panel is changed, the AVM-510A waits 20 seconds before registering an error. If the AVM-510A is currently reporting, do not change the front panel controls.
4. Errors in a report are marked with an asterisk (*) and with the time they first occurred. Sustained errors continue to carry this first occurance time in later reports. The time and date at the top of the report shows when this particular report was generated.

Special Considerations for Alarm Outputs

An alarm output can be set to activate with a preset delay when there is an error in a measurement set. Both closed captioning and audio missing can also be set to activate the alarm output.

Alarm Output

Pin one on the DC CONTROL/ALARM connector is dedicated to an alarm. When any automeasuremetn screen or Picture Guard shows an out-of-tolerance condition, this pin goes to ground (earth) if *MASTER ALARM* is enabled and after a delay set in *MASTER ALARM DELAY*.

To configure an alarm:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Entr** button.
3. Select *ALARM SETTINGS* and then press the **Entr** button.
4. Select *MASTER ALARM* and then press the **Entr** button to turn it *ON*.
5. Select *MASTER ALARM DELAY* and then turn the knob to set a delay of 0 (*OFF*) or to a delay setting in minutes.
6. Press the **Clr Mnu** button to exit.

The alarm output can be set to zero to give an immediate indication of an error for an alarm. The output can also be set to a delay to initiate other actions after an error has continued for longer than the delay setting. This action could be to switch to a backup path for routing or a backup video source.

Closed Caption Alarm

The AVM-510A can be set to cause an alarm output if the closed caption signal is missing for a preset time period.

To configure a closed caption alarm:

1. Press the **Config** button.
2. Select *OTHER* and then press the **Entr** button.
3. Select *ALARM SETTINGS* and then press the **Entr** button.
4. Select *CC ALARM DELAY* and then turn the knob to set a delay of 0 (*OFF*) or to a delay setting to enable the alarm.
5. Press the **Clr Mnu** to exit.

The alarm output is off when the delay is set to zero. The output can also be set to a delay to initiate the alarm when the error has continued for longer than the delay setting.

Audio Alarm

Audio limits can be set to generate reports or to activate an alarm if audio levels are above or below set limits for longer than a set time. Refer to the section on “Audio Limit Reporting,” in Chapter 8, for more information.

Notes

10. Measurement Screens (Parameters and Limits) (AVM-510A)

Introduction

This chapter lists details about the AVM-510A Series Automated Video Monitors (AVM-510A) signal processing capabilities automeasurement screens. The following tables are included:

- Where Parameters are Measured — lists each parameter, shows which measurement set(s) a parameter is found in, and whether a parameter is measured in NTSC, PAL, both NTSC and PAL, EBU, and SMPTE.
- Definitions of Automeasurement Parameters — lists all the parameters, giving their definitions and the units in which each is measured.
- Parameters: Range, Accuracy, and Limits — lists all the parameters with the range of measurement possible, the accuracy (absolute and relative), and the minimum and maximum limit settings.

Where Parameters are Measured (Composite)

Measured Parameter	System Video	Color Setup	Non-Linear	Frequency Response
0.5 MHz reference				NTSC
1.0 MHz				PAL
1.25 MHz				NTSC
2.0 MHz				Both
3.0 MHz				NTSC
3.58 MHz				NTSC
4.0 MHz				PAL
4.1 MHz				NTSC
4.8 MHz				PAL
5.8 MHz				PAL
APL(1)	Both			
Bar ampl			Both	NTSC
Black bar ampl				PAL
Blue ampl		Both		
Blue phase		Both		
Burst ampl(1)	Both	Both	Both	Both
Burst ref phase(1)	Both			
Chr/lum gain			Both	
Chr/lum dly			Both	
Chroma reference			Both	
Color frame(1)	Both			
Dif gain			Both	
Diff phase			Both	

continued

Measured Parameter	System Video	Color Setup	Non-Linear	Frequency Response
Green ampl		Both		
Green phase		Both		
H blanking(1)	Both			
H reference timing(1)	Both			
K-2T factor			Both	
Lum linearity			PAL	
Noise(1)	Both			
P/B ratio			Both	
Peak luma(1)	Both	Both	Both	
Peak video(1)	Both			
Pedestal ampl				Both
Red ampl		Both		
Red phase		Both		
Reference ampl				PAL
SC/H phase(1)	Both			
Setup	NTSC			
Sync ampl(1)	Both	Both	Both	Both
Weighted noise(1)			Both	
White bar ampl		Both		PAL
White bar				
Yellow ampl		Both		
Yellow phase		Both		

(1) Available with Picture Guard

EBU/SMPTE Component Measurements (A/B Inputs)

Measured Parameter	Definition
Y ampl	Y (luminance) amplitude.
B-Y ampl	B-Y color difference signal amplitude.
R-Y ampl	R-Y color difference signal amplitude.
Sync ampl	Sync amplitude (as encoded back onto signal).
Peak video	Peak of the luminance signal.
H timing Ref	Timing of input signal relative to Ext Ref.
B-Y to Y	Timing of B-Y relative to Y component.
R-Y to Y	Timing of R-Y relative to Y component.

Audio

Measured Parameter	Definition
1 left(1)	Upper and lower limits with alarm delays for each.
1 right(1)	Upper and lower limits with alarm delays for each.
2 left(1)	Upper and lower limits with alarm delays for each.
2 right(1)	Upper and lower limits with alarm delays for each.

(1) The same for both

Definitions of Automeasurement Parameters

Measured Parameter	Definition
0.5 MHz ref	Peak-to-peak amplitude of the 0.5 MHz packet, in IRE or mV.
1.25 through 5.8 MHz	Differences between the peak-to-peak amplitude of the frequency packet and the 0.5 MHz packet, in percent.
APL	Average of active video, aquired in blocks of 10 lines sequenced through the field, in percent.
Bar ampl	Level of the white bar in a multi-burst or non-linear signal, in IRE or mV.
Blue ampl	Peak-to-peak amplitude of the blue bar, in IRE or mV.
Burst ampl	Phase angle of the blue bar relative to zero degrees, in degrees.
Burst ref phase	Burst phase of an external reference-to-burst phase of the input signal, in degrees.
Chr/lum dly	Difference in timing between the luma and chroma parts of the modulated pulse, in ns.
Chr/lum gain	Difference in amplitude between the luma and chroma parts of the modulated pulse, in percent.
Chroma ref	Peak-to-peak amplitude of the chroma signal at the blanking level just prior to the five-step signal, in IRE or mV.
Color frame	Comparasion of the SC/H of line 51 of the selected signal to the SC/H of the external reference on line 201, extrapolated back to the selected line, in OK or ERR.
Diff gain	Each box represents on of the five steps in the signal. Each box shows the phase difference between the chroma reference and that step. Any step exceeding 2% shows a + or – in the box. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error (turns red if the limit is exceeded).
Diff phase	Each box represents on of the five steps in the signal. Each box shows the phase difference between the chroma reference and that step. Any step exceeding 2 degrees shows a + or – in the box. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error (turns red if the limit is exceeded).
Green ampl	Peak-to-peak amplitude of the green bar, in IRE or mV.
Green phase	Phase angle of the green bar relative to zero degrees, in degrees.
H blanking	The distance (in time) between the last video found at the *H BLANKING LEVEL* on any active line to the first video found at this level on any active line.
H ref timing	The time between the sync edge of the selected signal and the external reference sync edge, in µs.

continued

Measured Parameter	Definition
K-2 T factor	The %K factor if the mathematical representation of the pulse shape that best fits the K factor template equation.
Lum linearity	Boxes show the amplitude difference between the average of all steps and each step. Any step exceeding 2% shows a + or -. Any step exceeding the limit value turns red. The readout value is the peak-to-peak error (turns red if the limit is exceeded.
P/B ratio	Ratio of the pulse peak to the center of the bar, in percent.
Noise	CCIR unified weighted noise level on a separately selected line.
Peak luma	Amplitude of the highest luminance level, as though a signal were passed through the luma filter, during the active part of the video picture, in IRE or mV.
Peak video	Amplitude of the highest video level, including any chroma, during the active part of the video picture, in IRE or mV.
Pedestal ampl	Pedestal amplitude of the multi-burst signal, in IRE or mV.
Red ampl	Peak-to-peak amplitude of the red bar, in IRE or mV.
Red phase	Phase angle of the red bar relative to zero degrees, in degrees.
Reference ampl	Pedestal amplitude of a multi-burst signal scaled to reflect the level of the multi-burst packets, in IRE or mV.
SC/H phase	Phase relationship between the 50% point of the leading edge of sync compared to the color burst from the selected line, in degrees.
Setup	Difference in the level between the last setup of the color bar or blanking, or, in SMPTE bars, between setup of the IWQ part of the signal and blanking, in IRE.
Sync ampl	Difference between blanking and the sync tip, in IRE or mV.
VITC	Decode of the Vertical Internal Time Code (VITC) on the VITC selected line, in hours, minutes, and seconds.
White bar ampl	Difference in the level between the white bar and blanking, in IRE or mV.
Yellow ampl	Peak-to-peak amplitude of the yellow bar, in IRE or mV.
Yellow phase	Phase angle of the yellow bar relative to zero degrees, in degrees.

Parameters: Range, Accuracy, and Limits

Parameter	Range	Absolute Accuracy	Relative Accuracy	Notes	Min Setting	Max Setting	Default Min	Default Max
0.5 MHz reference	40 to 120 IRE	± 1 IRE	± 1 IRE	60 IRE nominal	0.5 IRE	100.1 IRE	0.5 IRE	100 IRE
0.5 through 5.8 MHz	280 to 840 mV	± 2%	± 2%	420 mV nominal	-50%	50%	-10%	10%
APL(1)	0 to 125%	± 3%	± 2%		-19%	129%	10%	100%
Bar ampl	50 to 138 IRE **350 to 980 mV**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	100 IRE nominal **700 mV nominal**	-49.5%	49.5%	-10%	10%
Black bar ampl	**0 to 280 mV**	**± 7 mV**	**± 3 mV**	**140 mV nominal**	**1 mV**	**279 mV**	**100 mV**	180 mV
Blue ampl	Nominal ± 50% **Nominal ± 50%**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	62.2 IRE nominal **470 mV nominal**	27.0 IRE **349 mV**	109 IRE **724 mV**	52 IRE **398 mV**	72 IRE **675 mV**
Blue phase	Nominal ± 90°	± 1°	± 1/2°	347.1° nominal	337.6°	356.6°	342.1°	352.1°
Burst ampl(1)	20 to 80 IRE **150 to 600 mV**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	40 IRE nominal **300 mV nominal**	20.5 IRE **151 mV**	58.5 IRE **449 mV**	30 IRE **225 mV**	50 IRE **375 mV**
Burst ref phase(1)	± 90°	± 2°	± 1°	Ext ref to input	-24°	24°	-10°	10°
Chr/lum dly	± 500 ns	± 5 ns	± 5 ns	Modulated pulse	-499 ns	499 ns	-50 ns	50 ns
Chr/lum gain	± 40%	± 2°	± ½%	Modulated pulse	-49.5 IRE	49.5 IRE	-10%	10%
Chroma reference	20 to 80 IRE **70 to 560 mV**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	40 IRE nominal **280 mV nominal**	20.5 IRE **151 mV**	59.5 IRE **449 mV**	30 IRE **225 mV**	50 IRE **375 mV**
Color frame(1)	± 30 µs			Result: OK/ERR				
Diff gain	± 20% **± 20%**	± 2% **± 2%**	± 1% ± 1%	40 IRE chroma **280 mV chroma**	-49.5%	-49.5%	-20%	20%
Diff phase	± 20° **± 20°**	± 2° **± 2°**	± 1/2° **± 1/2°**	40 IRE chroma **280 mV chroma**	-59.5°	-59.5°	-20°	20°
Green ampl	Nominal ± 50% **Nominal ± 50%**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	82.4 IRE nominal **620 mV nominal**	40 IRE **492 mV**	136 IRE **925 mV**	72 IRE **541 mV**	92 IRE **874 mV**
Green phase	Nominal ± 90°	± 1°	± 1/2°	240.8° nominal	231.3°	250.3°	235.8°	245.8°
H blanking(1)		± 50 ns **± 50 ns**	± 25 ns **± 25 ns**	Measures minimum interval	9.01 µs **11.01 µs**	11.99 µs **13.99 µs**	10.80 µs **12.80 µs**	11.00 µs **13.00 µs**
K-2 T factor	0 to 10%	± 1%	± 1/2%	2T pulse	0.3%Kf	9.8%Kf		2%Kf
Lum linearity	**0 to 50%**	**± 2%**	**± 1%**	**PAL std only**	**-49.5%**	**49.5%**	**± 20%**	**-20%**
P/B ratio	± 40%	± 1%	± 1/2%		-60.5%	139.5%	80%	120%
Reference timing	60 µs	± 10 ns	± 10 ns	Relative to external input	-2.00 µs	2.00 µs	-0.05 µs	0.05 µs
Noise(1)	40 to 70 dB	± 2 dB	± 2 dB	Weighted noise	-80 dB	-31 dB		-43 dB
Peak luma(1)	0 to 138 IRE **350 to 980 mV**	± 2 IRE **± 14 mV**	± 2 IRE **± 14 mV**	Active video **Active video**	1 IRE **5 mV**	134 IRE **950 mV**	7 IRE **10 mV**	110 IRE **735 mV**
Peak video(1)	0 to 138 IRE **350 to 980 mV**	± 2 IRE **± 14 mV**	± 2 IRE **± 14 mV**	Active video **Active video**	1 IRE **5 mV**	134 IRE **950 mV**	7 IRE **10 mV**	110 IRE **735 mV**
Pedestal ampl	20 to 70 IRE	± 1 IRE	± 1/2 IRE	40 IRE nominal	20.5 IRE	59.5 IRE	20.5 IRE	59.5 IRE

continued

Parameter	Range	Absolute Accuracy	Relative Accuracy	Notes	Min Setting	Max Setting	Default Min	Default Max
Red ampl	Nominal ± 50% **Nominal ± 50%**	± 1 IRE **± 7 mV**	± 1/2 IRE **± 3 mV**	88.2 IRE nominal **662 mV nominal**	44 IRE **533 mV**	148.9 IRE **985 mV**	78.0 IRE **582 mV**	98 IRE **936 mV**
Red phase	Nominal ± 90°	± 1°	± 1/2°	103.4° nominal	112.9°	112.9°	98.4°	108.4°
Reference ampl	**280 to 780 mV**	**± 7 mV**	**± 7 mV**	**420 mV nominal**	**599 mV**	**599 mV**	**400 mV**	**440 mV**
SC/H phase(1)	± 90°	± 5°	± 5°	0° nominal	-24°	24°	-10°	10°
Setup	± 15 IRE	± 1 IRE	± 1/2°	7.5 IRE, NTSC only	0.3 IRE	14.8 IRE	6 IRE	9 IRE
Sync ampl(1)	20 to 80 IRE **150 to 600 mV**	± 1 IRE **± 7 mV**	± 1/2° **± 3 mV**	40 IRE nominal **300 mV nominal**	32.2 IRE **201 mV**	47.7 IRE **399 mV**	35 IRE **265 mV**	45 IRE **335 mV**
VITC				Result:hh:mm:ss				
White bar ampl	50 to 138 IRE **350 to 980 mV**	± 1 IRE **± 7 mV** **± 7 mV**	± 1/2° **± 3 mV** **± 3 mV**	100 IRE nominal **700 mV (color)** **560 mV (freq)**	-49.5% **651 mV** **421 mV**	49.5% **749 mV** **699 mV**	70 IRE **680 mV** **505 mV**	110 IRE **720 mV** **615 mV**
Yellow ampl	Nominal ± 50% **Nominal ± 50%**	± 1 IRE **± 7 mV**	± 1/2° **± 3 mV**	62.2 IRE nominal **349 mV nominal**	42.5 IRE **727 mV**	81.5 IRE **720 mV**	52 IRE **398 mV**	72 IRE **678 mV**
Yellow phase	Nominal ± 90°	± 1°	± 1/2°	167.1° nominal	157.6°	176.6°	162.1°	172.1°
Zero reference pulse	50 to 138 IRE	± 1 IRE	± 1/2 IRE	On selected line				

(1) Available with Picture Guard

Range – The highest and lowest value that can be measured. **Bold** ranges and accuracies are for **PAL** automeasurement screens, when these are different from NTSC.

Absolute Accuracy – The relationship between the value measured and the actual value.

Relative Accuracy – The relationship between the measured value in one instance and the measured value in another instance, when the actual values are the same.

Min Setting – The lowest possible value of the minimum limit.

Max Setting – The highest possible value of the maximum limit.

Default Min/Max – Limit settings as shipped, or after a full system reset.

11. AVM-510A Option T (For Transmission Monitoring)

Introduction (AVM-510A-T)

This chapter describes the following functions added to the AVM-510A in the option T:

- Transmiter measurement set using zero carrier reference
- 1H line sweep of differential gain and differential phase
- Incidental Carrier Phase Modulation (ICPM) display of transmitter phasing from I and Q outputs of a broadcast quality demodulator

Transmitter Measurement Set

This section describes the following components in the transmitter measurement set:

- Zero carrier
- Measure line
- Measure signal ID

Zero Carrier

In the transmitter measurement set, the measurements for *PEAK VIDEO*, *WHITE BAR*, and *BLANKING LEVEL* are all referenced to a zero carrier reference pulse (see Figure 11-1). This reference pulse must be in the vertical interval on any horizontal line from 9 to 25, inclusive.

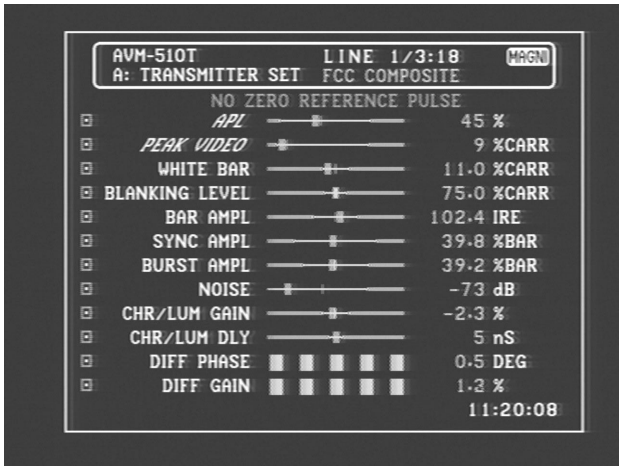


Figure 11-1. Transmitter Measurement Set

The AVM-510A-T senses the measurement signal on the selected line as indicated by the FIELD and LINE designation at the top of the transmitter set. If the correct signal (FCC COMPOSITE or NTS7 COMPOSITE for NTSC or PAL CCIR 17/330 or NATIONAL ITS) is not present, the zero carrier will also not be detected.

There are two ways you can designate the line number for the zero carrier reference pulse:

- Manually set which line the AVM-510A-T uses
- Enable the AVM-510A-T to search lines 9 through 25 for the reference pulse

To do so:

1. Press the **Mesmnt** button.
2. Select *ZERO CARRIER* and then press the **Entr** button (see Figure 11-2).
3. Select *LINE:* and then press the **Entr** button or turn the knob to choose between *SCAN* and *FIXED*.
4. If you select *FIXED*, select *FIXED LINE SELECT:* and then turn the knob to choose the line where the pulse is located.
5. Press the **Clr Mnu** button exit.

If you choose *SCAN*, the AVM-510A immediately begins to scan lines 9 through 25 (in the selected field) for a zero carrier reference pulse. Note that the Zero Carrier menu flickers as it scans to find the pulse.

> **NOTE:** If the width of the zero carrier reference pulse is less than 20 µs, you should operate in *FIXED* mode because the AVM-510A-T might not find a narrow reference pulse. Consequently, the AVM-510A-T will continously scan forever.

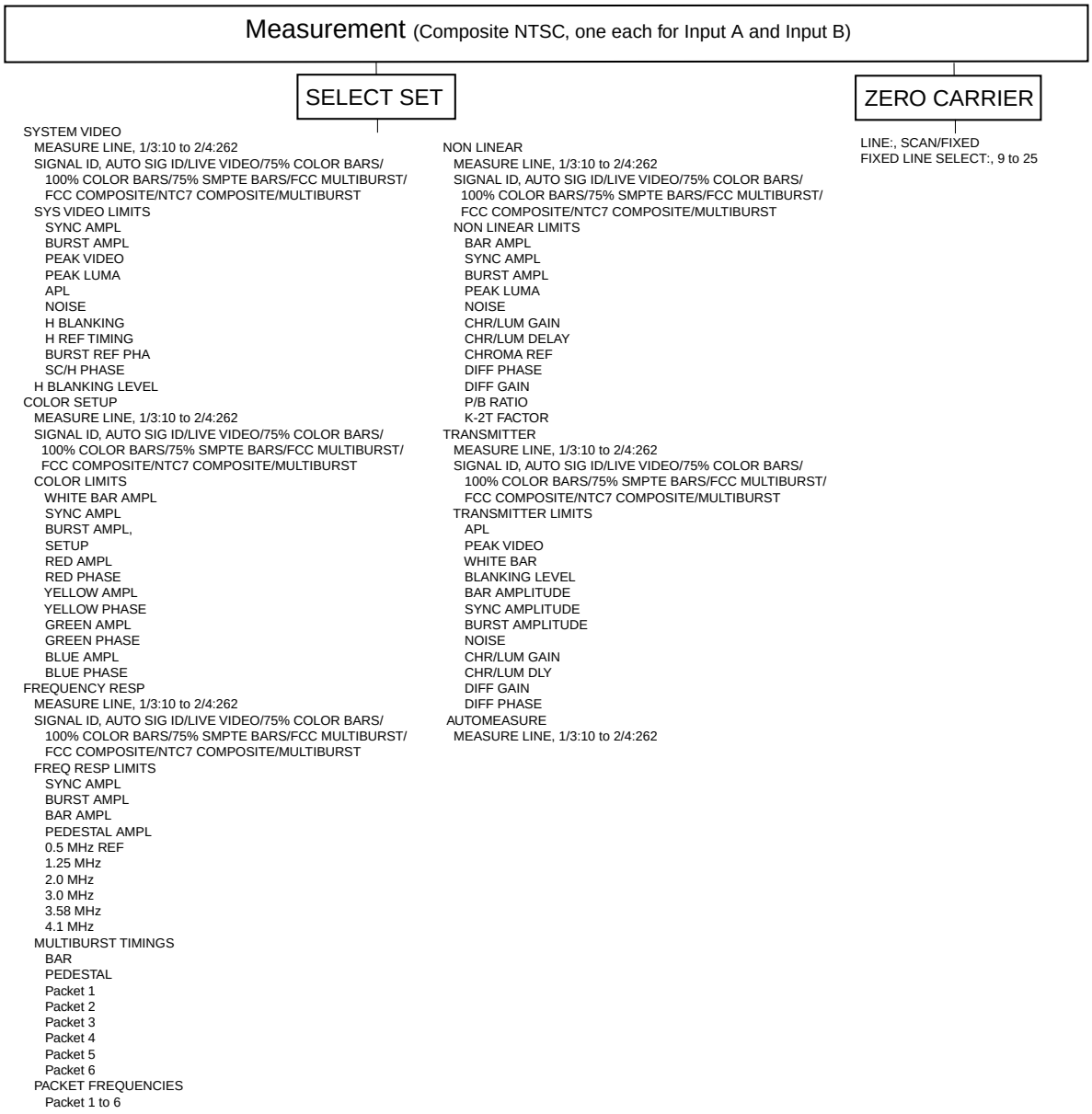
If the AVM-510A-T does not find a reference pulse, or if the *FIXED* line you selected does not have a reference pulse, the transmitter measurement set shows *NO ZERO REFERENCE PULSE* near the top of the display.

Measure Line

Notice the selected field and line number at the very top of the automeasurement display. You can designate the line and field of the signal to be monitored through the following menus:

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select *TRANSMITTER* and then press the **Entr** button.
4. Select *MEASURE LINE*.
5. Turn the knob to choose the line.
6. Press the **Field Select** button to switch fields or turn the knob through one field and then into the next.

The alternate method is to press the **Line Select** button (when you are in TRANSMITTER SET), turn the knob to set the line, and then press the **Field Select** button to set the field.



Note: Refer to "Parameters: Range, Accuracy, and Limits," in Chapter 10, for associated nominal values

510A-002

Figure 11-2. Transmitter Measurements

Measure Signal ID

The correct signal must be selected so that the zero carrier and the measured signal will be detected properly.

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select *TRANSMITTER* and then press the **Entr** button.
4. Select *SIGNAL ID* and then turn the knob to *AUTO SIGNAL ID*. If the signal is known, it can be set to FCC COMPOSITE, NTC7 COMPOSITE, CCIR 17/330 or NATIONAL ITS.

   NOTE: Refer to "Setting Automeasurement Limits" in chapter 9 for information on setting measurement limits.

   NOTE: The transmitter measurement set is never selected when *AUTOMEASURE/ AUTO MEAS SET* is active. It must be manually selected.

Differential Gain and Phase

A 1H line sweep display of differential gain or phase is available for the option T (see Figures 11-3 and 11-4). You select the differential gain function by accessing factory default memory 7. You can also select it by pressing the **VECTOR** button a third time when Input A or B is in the Composite format.

To set up the differential gain display:

1. Set the *BURST VECTOR* to 180° while in Vector mode.
2. Press the **VECTOR** button twice.
3. Vertically position the baseline to zero IRE (% inPAL).
4. Set the *VARIABLE GAIN* at the top position to 100 IRE (%).

   NOTE: The differential gain reading is the difference in % between the centers of the peak and the valley of the waveform.

You select the differential phase function by pressing the **VECTOR** button a fourth time. You can also select it by accessing factory default memory 8.

NOTE: All settings remain calibrated from the differential gain display.

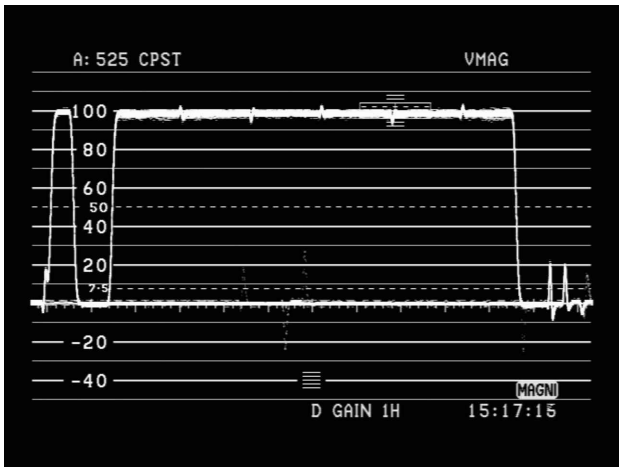


Figure 11-3. Differential Gain

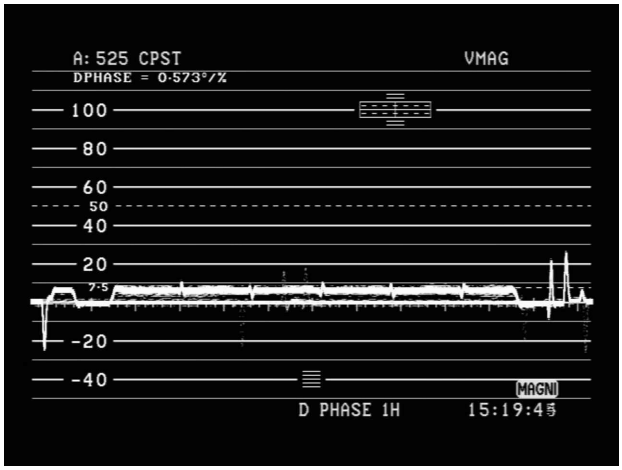


Figure 11-4. Differential Phase

To select the differential phase function:

1. Set the center of the lowest point on the waveform to zero.
2. View the center of the peak and calculate the difference in IRE/%.
3. Calculate the differential phase as listed in the following table or use 0.573°/IRE if the reading is under 20 IRE. The graticule in the IRE correlation-to-phase is 0.573° per IRE between 0 and 20 IRE.

IRE/%	Degrees
2	1.15
4	2.29
7.5	4.3
10	5.7
20	11.5
30	17.5
40	23.6
50	30.0
60	36.9
70	45.0

ICPM

The ICPM mode lets you monitor the phasing of the transmitter usint the I and Q signals from a broadcast quality demodulator. Two different resolutions are available for ICPM montoring. One is at 2°/division accessed by factory default memory 9 and the other is at 6°/division accessed by factory default memory 10.

The 4 horizontal lines starting from the top correspond to the zero carrier, 100IRE (or% in PAL), blanking, and sync levels of video. All are provided for calibration refferences.

Connections

The I (in-phase video) signal from the demodulator is connected to the B CPNT input Y signal BNC connector (see Figure 11-5). The other BNC connector of the loop through is connected with a short cable to the B CPNT input R-Y and terminated at the other connector with a 75 Ω terminator. Note that the I signal is a low pass video signal and that some demodulators only have a video output that can be used with a low pass filter.

The Q (Quadrature phase video) signal is routed though a 250 KHz termimated low pass filter to the B-Y input.

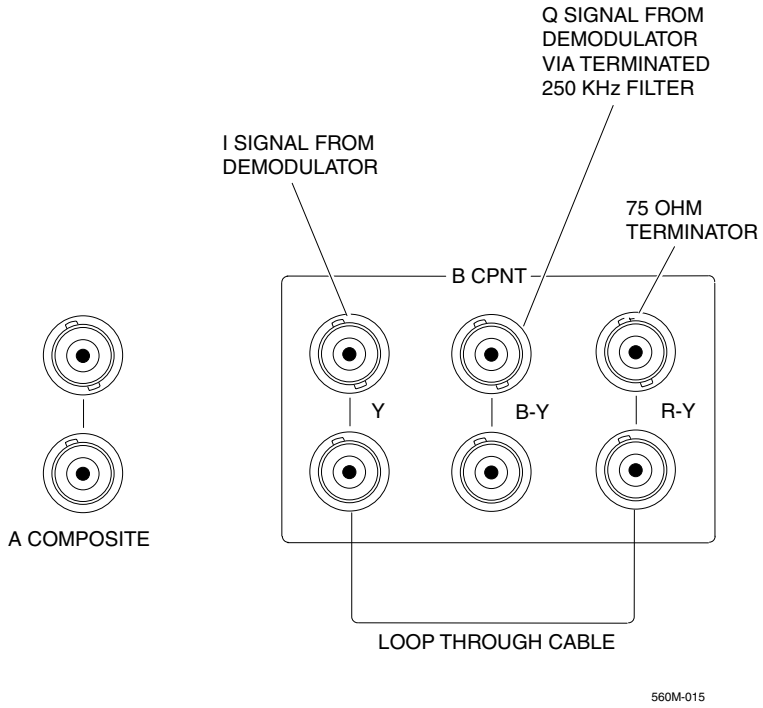


Figure 11-5. ICPM Connector Locations

Display Setup

As stated previously, ICPM modes can be accessed via factory default memories 9 and 10. The following procedures lets you set the display to the correct calibration if the I and Q signals are offset in gain or level (see Figures 11-6 and 11-7).

1. Press the **Blue** button and then the **Mesmnt** button to recall memory 9 with ICPM at 2°/division or to recall memory 10 with ICPM at 6°/division.
2. Move the **Horizontal** position to set the zero carrier point to center.
3. If necessary, change the gain to set the zero carrier point vertically to the top of the display. Note that the value of the phasing can be read from the graticule and that a line select might need to be enabled to see a VIT line when the transmitter is online.
4. Press the **Vector** button to change to 6°/division if the display is off the screen hoizontally.

The ICPM mode can be selected without the memory by:

1. Press the **Config** button.
2. Select *INPUTS* and and then press the **Entr** button.
3. Select *B INPUT*, set the format to *BETA*, and then press the **Clr Menu** button.
4. Press the **Input** button to select *B INPUT*.
5. Press the **Vector** button three times to display ICPM at 2°/division and then a fourth time to display ICPM at 6°/division.

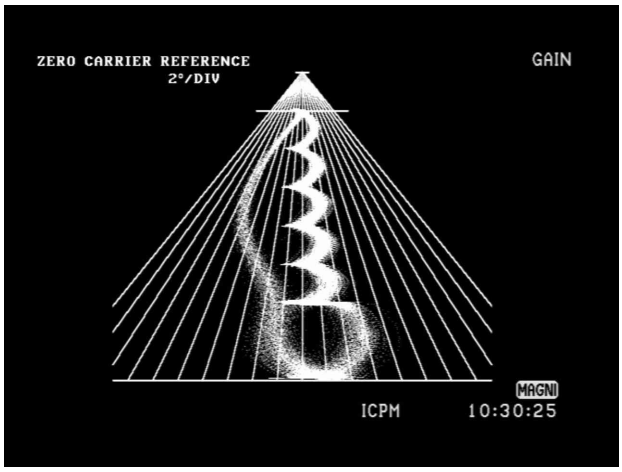


Figure 11-6. ICPM Display (2°/Division)

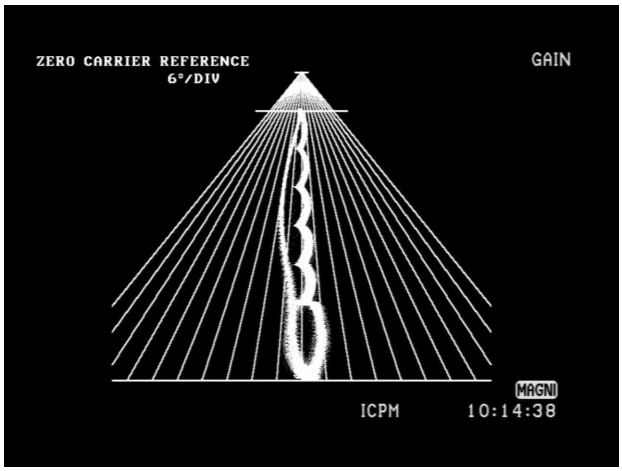


Figure 11-7. ICPM Display (6°/Division)

Memories

Memories have been factory set for applications with the most likely mode of operation. It might be necessary to change some settings in those memories.

For example, memory 9 with ICPM 2°/division set to full field display. This needs to be changed to only view a selected line that has the staircase needed for online transmitter monitoring. To do so:

1. Select *MEMORY 9* by pushing the **Blue** button and then the **Mesmnt** button.
2. Press the **Line Select** button and then rotate the knob to change the line or press the **Field Select** button to change the field.
3. Horizontaly position the zero carrier dot at the top of screen to the center.
4. Change gain to vertically position the zero carrier dot to the peak of the graticule.
5. Press the **Config** button.
6. Select *MEMORY*.
7. Select *MEMORY 9* and then press the **Entr** button to save.

If you don't know what line the signal is on, do the following:

1. Select *MEMORY 9*.
2. Press the **WFM** button.
3. Press the **Line Select** button and then rotate the knob to change the line or press the **Field Select** button to change the field to the view the correct signal as the first line of the waveform display.
4. Return to step 1.

Memory Table

AVM-510A-T Memory Locations

Memory	Input/Format	Description	Other Items
1	A Composite	Waveform, two line display	Nonlinear measurement set, line 17 field 1
2	A Composite	Picture with save title marks	System video measurement set, line 35 field 1
3	A Composite	Waveform and vector overlayed	
4	A Composite	Vector display	
5	A Composite	Automeasure, transmitter measurement set line 17 field 1	
6	A Composite	Split screen of picture inset with waveform and vector	
7	A Composite	Differential gain	Nonlinear measurement set, line 17 field 1
8	A Composite	Differential phase	Nonlinear measurement set, line 17 field 1
9	B Beta	ICPM at 2°/division	Transmitter measurement set line 17 field 1
10	B Beta	ICPM at 6°/division	Transmitter measurement set line 17 field 1

All settings are saved under each memory location.

Applications

Differential Gain/Phase

Differential gain is the luminance interaction on the gain of the chrominance. Differential phase is the luminance interaction on the phase of the chrominance. Both can be tested with a modulated staircase or ramp signals. There are specified VIT signals that include 5 step modulated stairsteps.

ICPM

ICPM mode is described as the unwanted carrier phase change due to the signal level change in an amplitude modulated vision signal. On a home receiver with envelope detectors where the inter-carrier mixing of sound and vision, ICPM in the vision signal decreases the audio signal to noise ratio and be heard as audio disturbances. These disturbances are commonly known as inter-carrier buzz.

ICPM can be monitored with the in-phase video (I) and the quadrature phase video (Q) outputs of a television demodulator operating in the synchronous detection mode. The typical video signal is a non-modulated staircase or luminance ramp signal.

The Magni AVM-510A-T accepts the I and Q signals from a broadcast television demodulator and provides a standard ICPM vector display either in full field or individual line select mode. Resolutions of 6°/division, for initial systems set up, and 2°/division, for narrower range monitoring are provided.

12. AVM-510A-C (For Component Measurements)

Introduction (AVM-510A-C)

The AVM-510A-C includes a component measurement set and a digital measurement set when an SDM-550 is interconnected.

Component Measurement Sets (AVM-510A-C)

Setting limits for component signals SMPTE/EBU, Beta, MII, and RGB can only be done when Input B: is active and is configured for a component signal.

To change the Input B: selection to component:

1. Press the **Config** button.
2. Select *INPUT* and then press the **Entr** button.
3. Select *INPUT B:* and then press the **Entr** button several times (or rotate the knob) until the component system you want appears on the display.

   NOTE: The AVM-510A-C can have different limits for each of the four component signal standards.
4. Press the **Clr Mnu** button to exit.

To set the component limits:

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. You should now only see one item *COMPONENT*. Press the **Entr** button to continue.
4. Select *MEASURE LINE* and then turn the knob to select the line which has the signal. Note that this might be in the active area or in the vertical interval. You can also switch from one field to another by turning the knob or by pressing the **Field Select** button.
5. Select *SIGNAL ID* and then press the **Entr** button several times to select one of the following:

- *AUTO SIG ID* — this signals the AVM-510A-C to determine what the signal is and apply that measurement set.
- *LIVE VIDEO* — this choice shuts off all the parameters except those that are appropriate for live video measurement.

- *75% COLOR BARS* — forces the AVM-510A-C to recognize the signal as 75% color bars (see Figure 12-1).
- *100% COLOR BARS* — the AVM-510A-C assumes the signal is 100% color bars.

6. Press the down **Arrow** button to highlight *xxx LIMITS*, where *xxx* is the component system currently configured for Input B:.
7. Press the **Entr** button to continue.

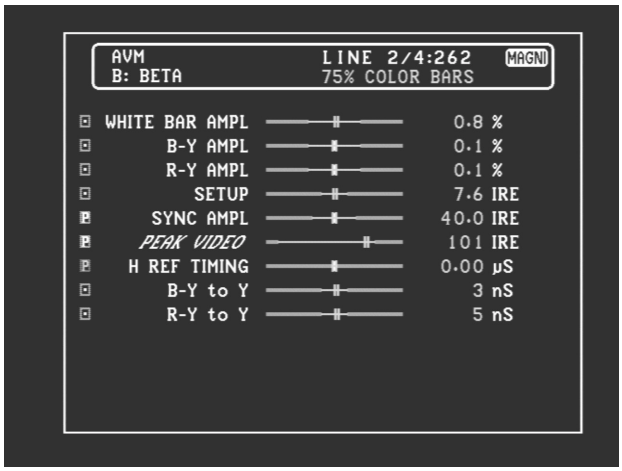


Figure 12-1. Setting Limits for Component Signals

8. Use the **Arrow** buttons to move the cursor up and down to the desired parameter.
9. Press the **Entr** button to move the cursor to the *MIN* column. Turn the knob to set the minimum acceptable value.
10. Press the **Entr** button to move the cursor to the *MAX* column. Turn the knob to set the maximum acceptable value.

    NOTE: When in the *MIN* and *MAX* columns, the **Arrow** buttons switch the cursor back and forth between the two columns. The **Entr** button moves from *MIN* to *MAX* , or from *MAX* out and down to the next parameter name. At this point, you are back to step 8. The **Prev Mnu** button moves the cursor to the parameter in the current row.

11. Press the **Clr Mnu** button to exit or press the **Prev Mnu** button twice to go back and pick another measurement set.

Serial Digital Measurement Set (AVM-510A-C and SDM-550)

NOTE: The digital measurement screen is only active when the AVM-510A-C is connected to an SDM-550.

The serial digital measuement set screen provides the following information, including numerical data not present in the picture monitor display (see Figure 12-2).

- SIG STRENGTH
- JITTER
- EDH RATE
- PEAK VIDEO

To access the serial digital measurement set screen:

1. Press the **Mesmnt** button.
2. Select *SELECT SET* and then press the **Entr** button.
3. Select *DIGITAL SET* and then press the **Entr** button.
4. Press the **Clr Mnu** button to exit.

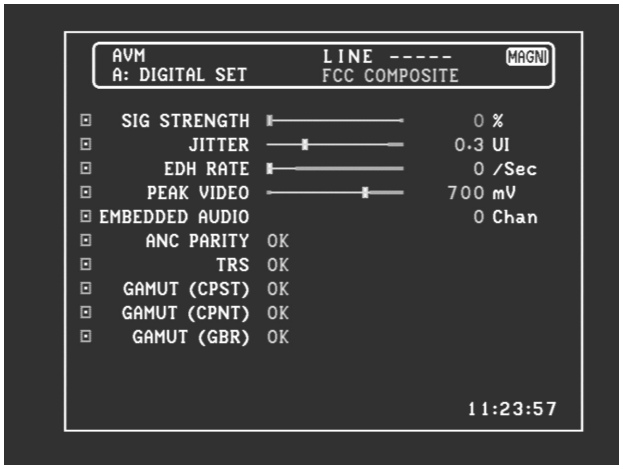


Figure 12-2. Serial Digital Measurement Screen

Notes

A. Specifications

Introduction

This appendix lists the the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A) electrical and mechanical specifications.

Electrical

Video Standards

- NTSC and PAL Composite plus S-video
- EBU, SMPTE, Beta, and MII Component (525/625)

Inputs

NOTE: All MM-410/AVM-510A input connectors are located at the rear panel unless otherwise noted.

Video Inputs

- Two loop through inputs (Input A: and Input B:)
  - Input A:, configurable for Composite or S-video
  - Input B:, configurable for 3-wire Component, S-video, or Composite

  NOTE: The single S-video input can be assigned to Input A:, Input B:, or left inactive
- Composite, S-video, and component loop through inputs:

Description	Specification
Return loss (75 Ω)	> 40 dB to 6 MHz
Maximum operating input voltage	+/– 2.5 V (dc + peak ac)
Input level before clipping	+/– 0.98 V dc relative to blanking level

Audio Inputs (AVM-510A)

- Four analog balanced inputs (> 15 k Ω impedance, 9 pin D-sub)

External Reference Input

- Composite loop through (NTSC/PAL)

Outputs

NOTE: All MM-410/AVM-510A connectors are located at the rear panel unless otherwise noted.

Picture Monitor Display Outputs

- Composite
- S-video

Display (MM-410)

- Rastor scan on-screen display on S-video or Composite picture monitor
- Waveform, vector, picture, or split screen display of all three

Display (AVM-510A)

- Rastor scan on-screen display on S-video or composite picture monitor
- Waveform, vector, picture, or split screen display of all three plus audio bar graph meters
- Measurements, waveform, vector, or picture with on-screen audio meters
- PictureGuard™ alarm on selected “Out of Limit” condition

Readout

- VITC time code or Real Time Clock (RTC)
- SCH frame reference

Memory

- Memory — 10 recallable memories, via the **Blue** (2nd) button, to store configurations and front panel settings
- Saving Images — up to 6 recallable waveform/vector images can be stored

Measurement Screens (AVM-510A)

- Component screen (AVM-510A-C)
- Composite screens:
  - System video
  - Color setup
  - Frequency response
  - Non linear
  - Transmitter (AVM-510A-T)

Measurement Parameters (AVM-510A)

AUDIO LEVEL (4 CHANNELS REPORT)	COMPONENT COLOR BAR MEAS. (AVM-510A-C)	LUMINANCE LINEARITY (PAL)
AVERAGE PICTURE LEVEL (APL)	COMPOSITE COLOR BAR MEAS.	NOISE
BURST AMPLITUDE	DIFFERENTIAL GAIN	PEAK LUMINANCE
BURST REFERENCE PHASE	DIFFERENTIAL PHASE	PEAK VIDEO
CHROMA / LUMA DELAY	FREQUENCY RESPONSE	PULSE BAR RATIO
CHROMA / LUMA GAIN	HORIZONTAL REFERENCE TIMING	SCH PHASE
CLOSED CAPTION PRESENCE, (NTSC)	HORIZONTAL BLANKING WIDTH	SYNC AMPLITUDE
COLOR FRAME	K-2T FACTOR	ZERO CARRIER REF. PULSE PRESENCE (AVM-510A-T)

PictureGuard™ (AVM-510A)

- Composite signal parameters:
  - Sync amplitude (loss of video)
  - Burst amplitude
  - Peak luminance amplitude
  - Peak video amplitude
  - Average Picture Level (APL)
  - Signal-to-noise ratio
  - SCH phase
  - Blanking (horizontal) width
  - Burst reference phase
  - Horizontal reference timing
  - Color frame
  - Close caption
- Component signal parameters:
  - Sync amplitude (loss of video)
  - Peak video amplitude
  - H-reference timing

Waveform

Description	Specification
Vertical gain accuracy	+/– 1% with 1.0 V input
Variable gain range	>-35% to 15%
Vertical Mag	x 2.5 typical
Frequency response:	
Flat response	+/– 1% to 6 MHz +/– 2% to 8 MHz (waveform mode) +/– 2% to 10 MHz (waveform/vector mode)
Low pass filter response	+/– 1% of dc at 50 kHz, < - 40 dB at fsc.
Band pass filter response	+/– 1% of dc at fsc. Attenuation of > 25 dB at 2 x fsc. 1.5 MHz bandwidth
Transient response:	
Pulse to bar ratio	0.99:1 to 1.01:1 typical
Pulse preshoot/ringing	< 1%
Line time tilt	< 1%
DC restorer:	
Slow	Typically 12 dB atten. At 50/60 Hz
Fast	> 26 dB atten. At 50/60 Hz
DC offsets between channels	+/– 7 mV
Timing difference between channels	+/– 5 ns
Sweep timing accuracy	Digitally derived
Time base	1H (5µs/div), 2H (10µs/div), 2F
Line select	Displays line 1 through line 262/312
Mag mode	1H (0.1µs/div), 2H (1.0µs/div), 2F (approx. x25)

Vector

Description	Specification
Display accuracy:	
Amplitude error	+/– 2%
Phase error	+/– 1.25º
Chroma bandwidth	700 kHz +/– 100 kHz
Variable gain range	- 40 to +/– 20%
Variable phase	360º
Vector MAG	x 2.5 typical

Noise (AVM-510A)

Description	Specification
Unified weighting filter	<–70 dBm noise floor

Audio (AVM-510A)

Description	Specification
Impedance	> 15 k Ω balanced input
Dynamic range	60 dBm with 1 dBm resolution +8 dBm over reference limit
Maximum input level	+20 dBm
Frequency response	Flat within +/– 2 dBm from 100 Hz to 20 kHz
Connector type	9-pin D female (male interconnect housing supplied)

Interfaces (MM-410)

- Ground closure interface:
  Logic level interface memory recalled for instrument control through memory settings

Interfaces (AVM-510A)

- Computer interface: RS-232 control port (9-pin D-sub female)
- Modem interface: RS-232 interface to modem for instrument control (9-pin D-sub female)
- Ground closure interface: Logic level interface memory recalled for instrument control through memory settings (9-pin D-sub female)
- Control interface: with SDM-550 (AVM-510A-C)

Logbook Software Specifications (AVM-510A)

- Supported: interconnect RS-232, modem
- Baud rate: 9.6 kB to 115 kB
- Control: interactive with computer screen, mouse, and Magni AVM series products
- Timing: real time scheduling referenced to computer clock
- Operating systems: Windows 98, 2000 Professional, 2000 ME, and Windows NT

Computer System Requirements (AVM-510A)

- Operating systems: Windows 95, 98, 2000 Professional, 2000 ME, and Windows NT
- Ports: one serial for RS-232C or modem, one parallel for printing
- Drives: one 3.5-inch diskette drive and one hard drive with 10 MB of free disk space
- Modems: two required for remote monitoring (one for each end of the phone line)

Power Requirement

- Line voltage: 100 to 240 V ac, 50/60 Hz
- 50 VA maximum

Mechanical

Dimensions

Description	Specification
Height	1 RU, 45 mm (1.75 in.)
Width	483 mm (19 in.)
Depth	432 mm (17 in.)
Weight	3.4 kg (7.5 lb)

Operating Conditions

- 0 to 50° C
- 90% relative humidity

Safety

- Tested to meet or exceed UL 1950, CSA 1402C, IEC 950
- CE Certified

B. Connector Pinouts

Introduction

This appendix identifies and describes the connector pinouts at the rear panel of the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and theAVM-510A Series AutomatedVideo Monitors (AVM-510A).

NOTE: Connector pinouts are viewed from the outside of the MM-410/AVM-510A rear panel and/or viewed from the wire side of the furnished connectors.

Video Input/Output Connector (4-Contact mini DIN)

Pin Number	Description
1	Ground
2	Ground
3	Y (composite) in/out
4	C in/out

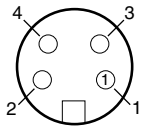


Figure B-1. Video Input/Out Pin Locations

RS-232 Connector (Modem/Printing) DCE

Pin Number	Description
1	Open
2	Transmitted data (TXD)
3	Received data (RXD)
4	Data terminal ready (DTR)
5	Signal ground
6	Data set ready (DSR)
7	Request to send (RTS)
8	Clear to send (CTS)
9	Open

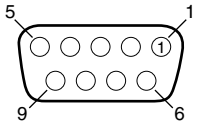


Figure B-2. RS-232 Pin Locations (Modem/Printing)

RS-232 Connector (Computer) DCE

Pin Number	Description
1	DCD
2	TXD
3	RXD
4	DIR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

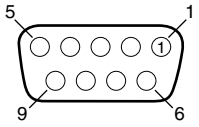


Figure B-3. RS-232 Pin Locations (Computer)

Analog Audio Input Connector (AVM-510A)

Pin Number	Description
1	Analog input 1+ (balanced)
2	Analog input 2+ (balanced)
3	Analog input 3+ (balanced)
4	Analog input 4+ (balanced)
5	Ground
6	Analog input 1- (balanced)
7	Analog input 2- (balanced)
8	Analog input 3- (balanced)
9	Analog input 4- (balanced)

Analog inputs 1 through 4 are two-wire inputs.

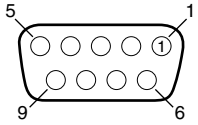


Figure B-4. Analog Input Pin Locations

DC Control/Alarm Connector

Pin Number	Description
1	Recall memory 1
2	Recall memory 2
3	Recall memory 3
4	Recall memory 4
5	Alarm out (AVM-510A)
6	Memory 1 out
7	Memory 2 out
8	Memory 3 out
9	Ground (earth)

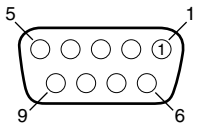


Figure B-5. DC Control/Alarm Pin Locations

Notes

C. Memory Locations

Introduction

This appendix lists the factory set memory locations for the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A). To make a change, follow the procedure described in "Saving Settings."

Saving Settings in Memory

After you configure the MM-410/AVM-510A, **you need to save it in memory**. The following procedure explains how to store an MM-410/AVM-510A configuration in a memory location using the *Config* (Configure) menu.

1. Select the desired signal input by pressing the **Input** button or through the *Config* menu options.
2. Configure the MM-410/AVM-510A for a desired mode.
3. Using the Vertical and Horizontal Position knobs, center the display.
4. Press the **Config** button to access the *Config* menu.
5. Using the arrow buttons, select *MEMORIES* and then press the **Enter** button.
6. Using the **Arrow** buttons, select *STORE MEMORY*.
7. Using the knob, select the desired memory location (1 through 10).
8. Press the **Enter** button to store that memory.
9. Press the **Clr Mnu** button to exit.
10. If you intend to view signals of several different formats, save them in other available memory locations using steps 1 through 8.

    NOTE: Settings for other formats or standards are also stored. For example, (1) the *+V SWITCH ON/OFF* setting for PAL even when memory is stored for NTSC and (2) limit settings for both standards are stored.

When a configuration is saved in a memory location, all MM-410/AVM-510A functions are stored in that memory. This includes items that are not displayed. For example, a waveform and measurement setup when a picture is displayed. For best results, recall a memory location, make a modification, and then store the new settings in another memory location.

To recall any stored memory at any time, press the **Blue** (2nd) button and then one of the Memory Recall buttons (for memories 1 through 10).

NOTE: You can also recall the first four memory locations through the ground closures of the DC CONTROL/ALARM connector. (see Figures 2-2 and 3-2).

Refer to Chapter 6, "Operating the MM-410/AVM-510A," for more information about using the Config menu to save memory locations.

MM-410/AVM-510A Memory Locations

Memory	Input/Format	Description	Other Items
1	A Composite	Waveform, two line display	
2	A Composite	Picture with save title marks	
3	A Composite	Waveform and vector overlayed	
4	A Composite	Vector display	
5	A Composite	Automeasure, system video measurement set	Waveform only in MM-410
6	A Composite	Split screen of picture inset with waveform and vector	
7	A Composite	Split screen of picture inset with waveform and vector	
8	A Composite	Waveform	
9	A Composite	Automeasure, non linear measurement set	Waveform only in MM-410
10	A Composite	Waveform	

All settings are saved under each memory location.

D. Calibration

Introduction

This appendix explains how to access the *CALIBRATION* menu options for the MM-410 Waveform/Vector Rasterizing Monitor (MM-410) and the AVM-510A Series Automated Video Monitors (AVM-510A).

CAUTION: Calibration should only be performed by qualified field service personnel.

NOTE: Calibration numbers specific to the MM-410/AVM-510A can be found on an insert supplied with this manual.

To access the *CALIBRATION* menu options:

1. Turn the MM-410/AVM-510A on.
2. When the Magni MM-410/AVM-510A screen appears, press the **Blue** (2nd) button twice.
3. After the MM-410/AVM-510A completely boots, press the **Blue** button twice to display the *CALIBRATION* menu options.

Notes

E. Command Codes (AVM-510A)

Introduction

This appendix describes the RS-232 protocol between the AVM-510A Series Automated Video Monitors (AVM-510A) and a Personal Computer (PC).

Guidelines

- Letters with ‘ ’ (single quotes) are literal and case sensitive. For example, an ‘a’ is the lower case ASCII letter a, with a decimal value of 97. In general, the case of the letters is significant and must be followed.
- <CR> means a carriage return. This is ASCII decimal code 13 or 0xD hex. It is used to terminate all text strings, either sending or receiving.
- Numbers inside [ ] represent an inclusive range. For example, [0…10] means any value from and including 0 up to and including 10.
- Spaces must not be used unless explicitly stated. A needed space is indicated by an underscore _.
- All data received or transmitted except raster dumps are ASCII values. For example, to send a value of 129, you must sent three characters: a ‘1’, a ‘2’, and then a ‘9’. This is not the same as sending a binary 129 value.
- Requests for information usually begin with a lower case letter. Control functions that change things usually begin with an upper case letter.

Placeholders

- S. .S is used to denote a string of characters. The string contains ASCII characters, possibly including spaces, but nothing below the ASCII binary value of a space (32), that is, no control codes.
- H is generally used to represent a hexadicimal digit from [0. . F].
- N is generally used to represent a decimal digit from [0. .9]. [N. .N] is used to represent an arbitrary number of successive digits that make up a decimal number.
- Bit 0 is always the Least Significant Bit (LSB).

PC to AVM-510A (Data Sent)

This section describes the data sent from a PC to the AVM-510A. Note that these strings are requests for data or control functions that affect the AVM-510A.

Request Functions

STATUS REQUEST	‘s’ <CR>	Refer to “Control Functions” for results.
BIT IMAGE SIZE	‘r’ N<CR>	Set raster image size N = 1 (full size image) N = 0 (¼ size image)

Example: r1<CR> causes the AVM-510A to select a ¼ size image.

SEND BIT IMAGE	‘q’ <CR>	Causes the AVM-510A to send a raster image. **Note:** The raster image is compressed according to the HP DeskJet method 2 TIFF compression (refer to the HP DeskJet Technical Reference Guide for details).
MEMORY STORE FUNCTION	‘M’ N<CR>	N is the memory number [1. .10] in which to store the current state.
MEMORY RECALL FUNCTION	‘m’ N<CR>	N is the memory number [1. .10] to be recalled.
V POS REQUEST	‘v’ <CR>	Also see V POS SET
H POS REQUEST	‘h’ <CR>	Also see H POS SET
VECTOR PHASE REQUEST	‘p’ <CR>	Also see VECTOR PHASE SET
VAR GAIN REQUEST	‘g’ <CR>	Also see VAR GAIN SET
SELECTED LINE REQUEST	‘l’ <CR>	Also see SELECTED LINE SET
MEASURE LINE REQUEST	‘n’ <CR>	Also see MEASURE LINE SET
SEND MEASURE DATA	‘b’ <CR>	ASCII string sent to PC
TIMECODE LINE REQUEST	‘t’ x<CR>	Also see TIMECODE LINE SET
INTENSITY REQUEST	‘i’ <CR>	Also see INTENSITY SET
PERSISTENCE REQUEST	‘d’ <CR>	Also see PERSISTENCE SET

BUTTON PRESS ‘B’N. .N <CR> N. .N = [0. .63]

This is the number of the button as follows:

Button Name	N. .N
BLUE	0
MES_MNT	1
CONFIG	2
UP_ARROW	3
PHASE	4
MENU_CLR	5
PRV_MNU	6
ENTER	7
DOWN_ARROW	8
VAR_GAIN	9
LINE_SEL	10
FIELD_SEL	11
SPLIT_SCRN	12
FILTER	13
DISPLAY	14
HMAG	15
SWEEP	16
VMAG	17
WFM_POS	18
INPUT	19
AUTO_MES	20
PICTURE	21
VECTOR	22
WFM	23
EXT_REF	33

Example: B23<CR> is a click on the WFM button.

modemtmt string ‘_’ AT xxxxx Compatible Hayes AT modem command codes can be used

KNOB TURN	‘K’N. .N<CR>	N. .N = [0. .63] The bits of this number are as follows: BIT0 V0 – V0 & V1 are velocity bits BIT1 V1 – 00 = slowest; 11 = fastest BIT2 (not used, leave at 0) BIT3 N0 – N0 & N1 are the knob selector bits BIT4 N1 – 00 = VPOS; 01 = HPOS 10 = MENU/VGAIN/LINESEL PHASE 11 = (not used) BIT5 Set for clockwise rotation; clr for counter (anti) clockwise rotation

Example: K43<CR> is a fast clockwise rotation of the H Pos knob.

H POS SET	‘H’N. .N<CR>	N. .N = [0. .999] This is a normalized position, that is, a value of 500 would put the slider in the middle of the range. 0 is all the way to the left; 999 is all the way to the right.
V POS SET	‘V’N. .N<CR>	N. .N = [0. .999] This is a normalized position, that is, a value of 500 would put the slider in the middle of the range. 0 is all the way to the bottom; 999 is all the way to the top.
VAR GAIN SET	‘G’N. .N<CR>	N. .N = [0. .255] 0 = most gain 255 = least gain
SELECTED LINE SET	‘L’S. .S<CR>	Also see SELECTED LINE REQUEST The string has the form: “1/3:123” “1/3” an odd field “123” line 123

MEASURE LINE SET	‘N’S. .S<CR>	Also see MEASURE LINE REQUEST The string has the form: “1/3:123” “1/3” an odd field “123” line 123
TIMECODE LINE SET	‘T’XN. .N<CR>	Also see TIMECODE LINE REQUEST N. .N = [9. .25]
INTENSITY SET	‘I’N. .N<CR>	Also see INTENSITY REQUEST N. .N = [1. .127] 1 is the minimum
PERSISTENCE SET	‘D’N. .N<CR>	Also see PERSISTENCE REQUEST N. .N = [128. .255] 128 = minimum persistence 255 = infinite persistence
VECTOR PHASE SET	‘P’N. .N<CR>	N. .N = [0. .999]

AVM-510A to PC

This section describes the data sent from the AVM-510A to a PC. Note that this data might be requested by the PC or it might arrive at the PC unsolicited.

STATUS INFORMATION	'S'H0H1H2H3H4H5 H6H7H8H9H10<CR>	**Note:** A 'b' in front of a bit indicates that it is a 3D button. A 'l' in front of a bit indicates that it is an LED status. An 'm' in front of a bit indicates that it is a Menu item status.
	H0	b bit0 wfm mode active b bit1 vector mode active b bit2 picture mode active b bit3 automeasure mode active
	H1	b bit0 split screen active b bit1 HMag active b bit2 VMag active b bit3 line select active
	H2	b bit0 variable gain active b bit1 vector phase active l bit2 ext ref on l bit3 LED A on (Input A:)
	H3	l bit0 LED B on (Input B:) l bit1 LED single on l bit2 LED alternate on l bit3 LED parade on
	H4	l bit0 LED luma on l bit1 LED chroma on l bit2 LED parade (filter) on l bit3 LED 1H on
	H5	l bit0 LED 2H on l bit1 LED 2F on l bit2 LED 1 on (wfm pos) l bit3 LED 2 on
	H6	l bit0 LED 3 on m bit1 clamp fast m bit2 bowtie on m bit3 line select 15 line mode on
	H7	m bit0 +V switching on m bit1 100% color bars mode m bit2 wide (VCR) lock on m bit3 SC/H phase display on

	H8	m bit0 color frame display on m bit1 VITC time code on m bit2 graticule off m bit3 PAL graticule in percent
	H9	m bit0 LED reduced size WFM m bit1 LED reduced size VEC m bit2 system in 625 line mode m bit3 measurement set 2 active
H POS NOTIFY	‘H’N . .N<CR>	N. .N = [0. .999] Response to H POS REQUEST. This is a normalized position, that is, a value of 500 would put the slider in the middle of the range. 0 is all the way to the left; 999 is all the way to the right.
V POS NOTIFY	‘V’N . .N<CR>	N. .N = [0. .999] Response to V POS REQUEST. This is a normalized position, that is, a value of 500 would put the slider in the middle of the range. 0 is all the way to the bottom; 999 is all the way to the top.
VECTOR PHASE NOTIFY	‘P’N . .N<CR>	N. .N = [0. .999] This is a normalized position, that is, a value of 500 would put the slider in the middle of the range.
VAR GAIN NOTIFY	‘G’N. .N<CR>	N. .N = [0. .255] Response to VAR GAIN REQUEST. 0 = least gain 255 = most gain
SELECTED LINE NOTIFY	‘L’S. .S<CR>	Response to SELECTED LINE REQUEST.
MEASURE LINE NOTIFY	‘N’S. .S<CR>	Response to MEASURE LINE REQUEST.

TIMECODE LINE NOTIFY	‘T’S. .S<CR>	Response to TIMECODE LINE REQUEST.
INTENSITY NOTIFY	‘I’N. .N<CR>	Response to INTENSITY REQUEST. N. .N = [1. .127] 1 = minimum intensity
PERSISTENCE NOTIFY	‘D’N. .N<CR>	Response to PERSISTENCE REQUEST. N. .N = [127. .255] 127 = minimum persistence 255 = infinite persistence

PC to AVM-510A (Commands)

This section describes the commands sent from a PC to the AVM-510A.

EXT REF SET	‘X’N<CR>	N = 0 for off N = 1 for on
CLAMP SET	‘C’N<CR>	N = 0 for slow N = 1 for fast
BOWTIE SET	‘W’N<CR>	N = 0 for off N = 1 for on
LINE SELECT MODE SET	‘Q’H<CR>	H = 2 for 2 line H = F for 15 line
+V SWITCH SET	‘+’N<CR>	N = 0 for off N = 1 for on
100% COLOR BARS SET	‘O’N<CR>	N = 0 for 75% N = 1 for 100%

VCR LOCK SET	‘Y’N<CR>	N = 0 for crystal lock (narrow) N = 1 for VCR lock (wide)
SC/H PHASE DISPLAY SET	‘Z’N<CR>	N = 0 for off N = 1 for on
COLOR FRAME SET	‘F’N<CR>	N = 0 for off N = 1 for on
VITC TIME CODE SET	‘J’N<CR>	N = 0 for off N = 1 for on
GRATICULE SET	‘A’N<CR>	N = 0 for off N = 1 for on N = 2 for added marks off N = 3 for added marks on
PAL GRAT PERCENT SET	‘6’N<CR>	N = 0 for volts N = 1 for percent
REDUCED SIZE SET	‘U’N<CR>	N = 0 for waveform only N = 1 for vector only N = 2 for for both waveform and vector
MEASURE SET SELECTED	‘S’N<CR>	N = 0 for color set N = 1 for non linear set N = 2 for freq set N = 3 for auto set N = 4 for txmtr set
AUDIO METER	‘E’N<CR>	N = 0 for entire meter off N = 1 entire meter on
IMAGE RECALL	‘R’N<CR>	N = 0 for image 1 N = 1 for image 2 N = 2 for image 3 N = 3 for image 4 N = 4 for image 5 N = 5 for image 6

PC CONTROL

REPORTING	'^R'<CR>	Sets RS232 and Modem interface to send reports from the REPORT function.
CONTROL/ LOGBOOK	'^C'<CR>	Sets RS232 and Modem interface to control the AVM-510A and transfer Waveforms.

F. Glossary of Terms

1H

Display of one horizontal line of video.

2H

Display of two horizontal lines of video.

Alternate

A method of displaying separate signals or separate parts of a component signal in which the parts are super-imposed on top of each other.

Blanking

The level of picture when there is no picture information at all. The 0 VDC level. In NTSC, blanking is below the black level. In PAL, blanking and black are the same level.

BNC

The standard coaxial video connector.

Brightup

The brightening in a flashing mode of certain parts of a picture (while in picture mode) to indicate a problem where a gamut limit has been exceeded.

Burst

Color burst.

B-Y

The Blue minus luminance component of a component video signal.

Component Video

A video system in which the luminance and chrominance parts of the signal are carried on separate wires or in separate channels. Sony's Beta and Panasonic's MII are both component signals. The three parts of the signal are Y (luminance only), B-Y (blue value minus the luminance value) and R-Y (red value minus the luminance value). These parts are sometimes designated Y, Pb, Pr or Y, Cb, Cr. S-video is **not** considered a component system in this manual.

Chrominance

The part of the video signal with the color information. In component and s-video signals, the chrominance is carried in a separate channel. In composite, the chrominance is on a subcarrier in the same channel.

Clamping

Removing slow changes in DC level by all video levels to the blanking level.

Color Burst

The brief color subcarrier that immediately follows the trailing edge of sync.

Color Frame

A sequence of two (in NTSC) or four (in PAL) frames of video. Signals are “in the same color frame” if they both start with the same phase of burst.

Composite Video

A video signal carried in one channel or on one wire that has all the luminance and chrominance information. NTSC and PAL are composite video standards.

Configure

To choose options in the MM-410/AVM-510A.

Even Field

Fields 2 and 4 in NTSC; fields 2, 4, 6, and 8 in PAL.

External Reference

A separate video signal, with or without picture information, used to lock or synchronize the signal being viewed. In the MM-410/AVM-510A, the external reference sync signal must be at normal video sync levels. 4V sync, used in some video systems, is **not** acceptable and can damage the MM-410/AVM-510A.

Field

The amount of video signal required to scan the picture once from top to bottom, including one vertical interval. In NTSC and PAL, two fields make one frame. Fields are designated as either odd or even.

Frame

The amount of video signal required to make one complete picture, or two fields. See also, Color frame.

Gamut

A signal component over levels detection system that indicates when a signal’s component amplitude levels exceed pre-defined amplitude levels.

GBR

Green, blue, red. These are the components of the video signal as they are first encountered in a camera. GBR is the same as RGB. In this manual, the letters are given in GBR order, because the green channel carries the sync pulse, if this signal has any sync at all.

Graticule

The reference marks in a waveform display showing horizontal lines for measuring amplitude. One line, the blanking line, has short vertical marks for measuring time. Also, the circular graticule for vector displays, sometimes called a “rose,” that is marked for degree measurements.

Internal Reference

Using the viewed signal's own sync as the MM-410/AVM-510A’s timing reference.

ITS

Insertion Test Signal. A test signal in the vertical interval. Same as VITS.

Jitter

Timing variations in a serial digital signal.

Luma

Luminance

Luminance

The parts of the signal that indicate the brightness of the picture.

MII

A component system designed by Panasonic.

Odd Field

Fields 1 and 3 in NTSC; fields 1, 3, 5, and 7 in PAL.

Parade

A sequence of separate line display spaced horizontally in the display. In the MM-410/AVM-510A, a parade display is available for viewing the two inputs, for viewing the separate parts of a component signal, and for viewing the filters simultaneously.

Parameter

A quantity or characteristic of a signal that can be named and measured apart from other aspects of the signal, such as sync amplitude, chrominance/luminance delay, and peak video.

Picture Brightup

See Brightup.

Picture Guard

Engages some of the measurement capabilities of the automeasure screen when viewing a video picture.

RGB

Red, green, and blue components of a video signal. Same as GBR.

R-Y

The Red minus luminance component of a component video signal.

S-VHS or Hi8

Video tape formats with separated Y and C channels.

S-Video

A means of a video connection for separate Y and C channels.

Safe Action Area

The area within the picture where any action is sure to be seen on any television monitor or receiver. This is usually defined as all the central part of the picture except for anything closer than 5% to the edge of the scan.

Safe Title Area

The area within the picture where a title is sure to be seen on any television monitor or receiver. This is usually defined as all the central part of the picture except for anything closer than 10% to the edge of the scan.

SC/H Phase

The subcarrier (SC) to horizontal (H) phase, expressed in degrees. If the SC/H phase is larger than ± 40°, editing equipment might not be able to detect if two color signals are in the same color frame.

SMPTE

A standard set by the Society of Motion Picture and Television Engineers for a component video system.

VITC

Vertical Interval Time Code, a system for timing each frame of a video signal by inserting a digital signal in the vertical interval. It designates each frame with an hour, minute, second and frame count number, plus other numbers called User Defined. The MM-410/AVM-510A can display the hours, minutes and seconds of the code.

VITS

Vertical Interval Test Signal, a test signal inserted onto a line in the vertical interval, sometimes in one field, sometimes in both fields.

Y

The luminance component of a component signal.

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